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NASA Contractor Report 2915

Two-Dimensional Wind Tunnel Test of an Oscillating Rotor Airfoil

Volume II

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Two-Dimensional Wind Tunnel Test of an Oscillating Rotor Airfoil

Volume II

L. U. Dadone

Boeing Vertol Company
Philadelphia, Pennsylvania

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TWO-DIMENSIONAL WIND TUNNEL TEST OF AN OSCILLATING ROTOR AIRFOIL DATA REPORT

(Volume II)

by

L. U. Dadone
Boeing Vertol Company

SUMMARY

An experimental investigation was conducted to determine the quasi-steady and unsteady characteristics of the NLR 7223-62 airfoil, an advanced section designed for helicopter rotor applications. The data were obtained with an airfoil model equipped with 17 differential transducers and mounted in the variable density test section of a blow-down wind tunnel. The test equipment and procedures were similar to other oscillating airfoil tests previously conducted in the same facility.

Quasi-steady pressure data were acquired at Mach numbers between M = 0.2 and 0.9 with porous floor and ceiling (4.9% porosity). Drag data were acquired at a limited number of conditions with a wake-traversing probe. Static and oscillatory tests were then run with solid floor and ceiling at Mach numbers between M = 0.2 and M = 0.7.

The oscillatory test was run at frequencies from 23 Hz to approximately 90 Hz, with amplitudes of oscillation ranging from 2.5° to 10.0°. The test results are presented in two volumes. The first volume documents the test procedure and discusses some of the key results. The second volume is a data report and it contains tabulations of all static and oscillatory data.

LIST OF SYMBOLS

Computer Listing	Text	Description
AERO DAMP		symbol for $[2\pi^2 f_D(\Delta\alpha)^2]^{-1} \oint C_m d\alpha$, work-per-cycle coefficient
ALPHA	α	airfoil angle of attack, deg
ALPHA·NMAX		airfoil angle of attack at maximum value of normal force during a cycle of oscillation, deg

Computer Listing	Text	Description
ALPHA·0	α_o	mean angle of attack during oscillation cycle, deg
	c	airfoil chord, m
	Cd	airfoil drag coefficient (drag force/unit span)/$q_\infty c$
CM	C_m	airfoil pitching-moment coefficient, (pitching moment/unit span)/$q_\infty c^2$
CM(MIN)		maximum magnitude of pitching-moment coefficient attained during oscillation
CN	C_n	airfoil normal force coefficient, (normal force/unit span)/$q_\infty c$
CN(MAX)		maximum magnitude of normal-force coefficient attained during oscillation
DCP	ΔC_p	differential pressure coefficient, $\Delta P/q_\infty$
DEL·ALPHA	$\Delta\alpha$	amplitude of pitching motion, deg
DRIVE HZ	f_D	drive frequency of airfoil motion in pitch, Hertz
K	k	reduced frequency, $\pi fc/V$
MACH NO.	M	Mach number
n PHI		computer symbol for phase lead of response with respect to forcing motion for the nth harmonic, deg
	P_T	tunnel test section total pressure, N/m^2 (lb/in^2)
Q	q	dynamic pressure, defined as $\frac{1}{2}\rho V^2$, N/m^2 (lb/ft^2)
RES n		magnitude of resultant for the nth harmonic
RN	Rn	Reynolds number based on airfoil chord

Computer Listing	Text	Description
TDR		ratio of the work-per-cycle coefficient to the theoretical value
TP		test point identification
V		tunnel velocity, m/sec (ft/sec)
X/C	x/c	chordwise position, measured from the leading edge as a fraction of the chord

SUMMARY OF TEST CONDITIONS

QUASI-STEADY FLOW CONDITIONS

1. Floor and Ceiling with 4.9% Porosity

1.1 Pressures and Integrated Data

Mach No.	Rn x 10^{-6}	Page No.
0.2	1.55	11
0.2	3.2	13
0.3	4.8	15
0.4	6.3	17
0.5	7.9	19
0.6	3.2	21
0.6	6.3	24
0.6	9.4	27
0.7	10.0	32
0.75	10.0	37
0.8	10.5	39
0.85	11.0	42
0.9	3.6	44
0.9	7.2	45
0.9	11.0	46

1.2 Drag Data - See Table II 47

2. Solid Floor and Ceiling

Pressures and Integrated Data

Mach No.	Rn x 10^{-6}	Page No.
0.2	3.2	48
0.3	4.8	50
0.4	2.3	53
	4.7	56
	6.3	59
	7.0	62
0.5	7.9	65
0.6	3.1	68
	6.2	70
	9.1	72
0.7	10.0	75

FORCED PITCH OSCILLATION FOR THE NLR 7223-62 AIRFOIL

$\Delta\alpha$ (DEG)	f_D (HZ)	M	α_o (DEG) 0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	Rn $x10^{-6}$	k
			PAGE NUMBER OF COMPUTER DATA										
2.5	23	0.2	78	78	79	79	80	80	81	81	82	3.2	0.17
	23	0.3	82	83	83	84	84	85	85	86	86	4.8	0.12
	46		87	87	88	88	89	89	90	90	91	4.8	0.23
	69		91	92	92	93	93	94	94	95	95	4.8	0.34
	23	0.4	96	96	97	97	98	98	99	99	100	6.4	0.09
	46		100	101	101	102	102	103	103	104	104	6.4	0.18
	69		105	105	106	106	107	107	108	108	109	6.4	0.26
	23	0.5	109	110	110	111	111	112	112	113	-	7.9	0.07
	46		113	114	114	115	115	116	116	117	-	7.9	0.14
	69		117	118	118	119	119	120	120	121	-	8.0	0.22
	23	0.6	121	122	122	123	123	124	124	-	-	9.5	0.06
	46		125	125	126	126	127	127	128	-	-	9.5	0.12
	69		128	129	129	130	130	131	131	-	-	9.5	0.18
	23	0.7	132	132	133	133	134	134	-	-	-	10.0	0.05
	46		-	135	-	135	136	136	-	-	-	10.0	0.11
	69		137	137	138	138	139	-	-	-	-	10.0	0.16

FORCED PITCH OSCILLATION FOR THE NLR 7223-62 AIRFOIL

$\Delta\alpha$ (DEG)	f_D (HZ)	M	α_o (DEG) 0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	Rn $x10^{-6}$	k
			PAGE NUMBER OF COMPUTER DATA										
5.0	23	0.2	139	140	140	141	141	142	142	143	143	3.2	0.175
	46		144	144	145	145	146	146	147	147	148	3.2	0.35
	69		148	149	149	150	150	151	151	152	152	3.2	0.51
	23	0.3	153	153	154	154	155	155	156	156	157	4.8	0.12
	46		157	158	158	159	159	160	160	161	161	4.8	0.23
	69		162	162	163	163	164	164	165	165	166	4.8	0.35
	23	0.4	166	167	167	168	168	169	169	170	170	2.4	0.09
			171	171	172	172	173	173	174	174	175	4.7	
			175	176	176	177	177	178	178	179	179	6.4	
			180	180	181	181	182	182	183	183	184	7.0	
	46		184	185	185	186	186	187	187	188	188	6.4	0.17
	50		-	-	189	189	190	190	191	-	-	6.4	0.19
	52		-	-	191	192	192	193	193	-	-	6.4	0.192
	53		-	-	194	194	195	195	196	-	-	6.4	0.195
	54		-	-	196	197	197	198	198	-	-	6.4	0.20
	69		199	199	200	200	201	201	202	202	203	6.4	0.26

FORCED PITCH OSCILLATION FOR THE NLR 7223-62 AIRFOIL

$\Delta\alpha$ (DEG)	f_D (HZ)	M	α_o (DEG) 0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	Rn $x10^{-6}$	k
			PAGE NUMBER OF COMPUTER DATA										
5.0	88	0.4	203	204	204	205	205	206	206	-	-	2.4	0.34
	23	0.5	207	207	208	208	209	209	-	210	210	7.9	0.07
			-	-	-	-	211	211	212	-	-	8.0	0.07
	46		213	213	214	214	215	215	216	216	217	8.0	0.14
	69		217	218	218	219	219	220	-	220	-	8.2	0.20
			221	221	-	-	-	-	-	-	-	8.2	0.20
	23	0.6	222	222	223	223	224	-	-	-	-	9.3	0.06
			-	-	-	-	224	225	225	226	-	9.2	0.06
			226	227	227	228	228	229	229	230	-	6.2	0.06
			-	230	-	231	231	232	232	-	-	3.1	0.06
	46		-	-	-	-	-	233	234	234	-	9.2	0.12
			-	-	-	-	235	-	-	-	-	9.3	0.12
	69		235	236	236	237	237	238	238	-	-	9.2	0.18
	23	0.7	239	239	240	240	241	241	-	-	-	10.0	0.05

FORCED PITCH OSCILLATION FOR THE NLR 7223-62 AIRFOIL

$\Delta\alpha$ (DEG)	f_D (HZ)	M	α_o (DEG) 0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	Rn $x10^{-6}$	k
			PAGE NUMBER OF COMPUTER DATA										
7.5	23	0.2	-	242	242	243	243	244	-	-	-	3.2	0.17
		0.3	244	245	245	246	246	247	-	-	-	4.8	0.116
		0.4	247	248	248	249	249	-	-	-	-	6.4	0.09
	46		250	250	251	251	252	-	-	-	-	6.4	0.17
	23	0.5	252	253	253	254	-	-	-	-	-	8.0	0.07
	46		254	255	255	256	-	-	-	-	-	8.0	0.14
	23	0.6	256	257	257	-	-	-	-	-	-	9.4	0.06
		0.7	258	258	259	-	-	-	-	-	-	9.4	0.057

FORCED PITCH OSCILLATION FOR THE NLR 7223-62 AIRFOIL

$\Delta\alpha$ (DEG)	f (HZ)	M	α_o (DEG) 0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	Rn $x10^{-6}$	k
			PAGE NUMBER OF COMPUTER DATA										
10.0	23	0.2	259	260	260	261	261	-	-	-	-	3.2	0.17
		0.3	262	-	262	263	263	-	-	-	-	4.8	0.115
		0.4	264	264	265	265	266	-	-	-	-	6.4	0.086
	46		266	267	267	268	-	-	-	-	-	6.4	0.17
	69		268	269	269	270	-	-	-	-	-	6.4	0.27
	23	0.5	270	271	271	272	-	-	-	-	-	7.9	0.07
		0.6	272	273	273	-	-	-	-	-	-	9.3	0.06
		0.7	274	274	275	-	-	-	-	-	-	10.0	0.052
5.0	40	0.2	-	-	-	-	-	276[1]	276	277[2]	-	3.3	0.29
7.5			-	-	-	-	-	277[1]	278	278[2]	-		
10.0			-	-	-	-		279[1]	279	280[2]	-		

NOTES:

[1] $\alpha_o = 14°$

[2] $\alpha_o = 16°$

TABLE I. SUMMARY OF MODEL CHARACTERISTICS

Airfoil Section	NLR 7223-62 (or NLR-1)
Model Span	0.3048m (12 inches, nominal)
Model Scale	1/4.23, based on a 0.686m (2.25 ft) full-scale blade chord
Model Chord	0.162m (6.38 in.)
Thickness Ratio	8.6 percent
Construction	Machined from Maraging Steel
Transducers:	
Type	Kulite Model No. 63-11967, Differential
Number Installed	17
Location in Percent Chord	1.01, 1.99, 3.0, 4.91, 7.37, 9.91, 14.93, 19.99, 24.97, 29.98, 39.91, 50.07, 60.05, 70.09, 80.02, 89.96, 96.91
Pressure Range	$\pm$ 5.17x10^5 N/m^2 ($\pm$ 75 psi) from 1 to 5 percent chord
	$\pm$ 3.45x10^5 N/m^2 ($\pm$ 50 psi) from 7.5 to 97 percent chord
Minimum Natural Frequency as Installed	2,800 Hz

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.199 Rn = 1.55 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		-8.277	-7.462	-6.655	-6.305	-5.905	-4.415	-3.876	-3.515	-2.544	-2.107	-1.462
CN		-0.486	-0.414	-0.404	-0.378	-0.369	-0.230	-0.209	-0.132	-0.120	-0.073	-0.003
CM		-0.033	-0.057	-0.041	-0.041	-0.027	-0.034	-0.022	-0.029	-0.014	-0.021	-0.015
DCP 1	.010	-2.620	-2.834	-2.936	-3.390	-4.895	-3.941	-3.263	-2.666	-2.430	-2.815	-1.809
DCP 2	.020	-2.108	-2.170	-2.393	-2.765	-2.894	-1.681	-1.908	-1.467	-1.393	-1.250	-1.046
DCP 3	.030	-1.826	-1.991	-2.096	-2.223	-2.324	-1.496	-1.422	-1.176	-1.081	-0.706	-0.581
DCP 4	.049	-2.050	-2.007	-2.231	-2.275	-1.630	-1.221	-1.161	-0.963	-0.695	-0.741	-0.394
DCP 5	.074	-1.920	-1.815	-1.820	-1.806	-1.365	-0.842	-0.764	-0.670	-0.381	-0.310	-0.175
DCP 6	.099	-1.475	-1.701	-1.237	-1.184	-0.725	-0.455	-0.363	-0.281	-0.234	-0.017	0.252
DCP 7	.149	-1.254	-1.291	-1.057	-0.936	-0.611	-0.473	-0.506	-0.313	-0.203	-0.161	-0.175
DCP 8	.200	-1.015	-0.648	-0.625	-0.418	-0.571	-0.397	-0.044	-0.086	-0.079	-0.062	0.291
DCP 9	.250	-0.644	-0.642	-0.393	-0.357	-0.434	-0.320	-0.204	-0.112	-0.150	0.025	0.095
DCP10	.300	-0.617	-0.495	-0.385	-0.247	-0.173	-0.240	-0.180	-0.165	-0.118	-0.070	-0.081
DCP11	.395	-0.393	-0.280	-0.316	-0.228	-0.340	-0.147	-0.138	0.022	0.020	-0.035	0.062
DCP12	.501	-0.142	-0.135	-0.156	-0.193	-0.111	-0.033	-0.004	0.017	0.068	-0.007	0.112
DCP13	.600	-0.257	-0.029	-0.054	0.002	-0.114	0.026	-0.163	-0.028	-0.064	0.101	0.147
DCP14	.701	0.103	0.116	0.051	0.094	0.022	0.085	0.037	0.018	0.021	0.169	0.090
DCP15	.800	0.135	0.166	0.109	0.063	0.139	0.072	0.082	0.175	0.117	0.045	0.142
DCP16	.900	-0.103	0.046	-0.061	-0.044	-0.168	0.019	-0.025	-0.026	-0.087	-0.097	-0.127
DCP17	.969	-0.131	-0.052	-0.075	-0.192	-0.221	-0.166	-0.119	-0.098	-0.114	-0.086	-0.223

DATA TYPE	X/C											
ALPHA		-0.464	0.100	1.007	1.370	1.575	4.010	4.336	4.883	5.613	6.390	6.650
CN		0.095	0.131	0.216	0.255	0.297	0.474	0.508	0.552	0.635	0.688	0.749
CM		-0.015	-0.027	-0.018	-0.013	-0.016	-0.036	-0.036	-0.012	-0.015	-0.038	-0.022
DCP 1	.010	-1.138	-1.062	-0.785	-0.184	0.128	1.435	1.760	1.914	1.526	2.455	2.095
DCP 2	.020	-0.455	-0.265	0.004	0.197	0.585	1.338	1.707	1.901	2.226	2.397	2.722
DCP 3	.030	-0.119	-0.111	0.349	0.585	0.719	1.525	1.855	1.877	2.125	2.505	2.616
DCP 4	.049	-0.109	0.087	0.094	0.473	0.679	1.262	1.515	1.600	1.655	1.554	2.174
DCP 5	.074	0.092	0.236	0.453	0.480	0.554	1.263	1.341	1.490	1.651	1.944	1.960
DCP 6	.099	0.287	0.363	0.687	0.830	0.840	1.446	1.459	1.440	1.638	1.825	2.016
DCP 7	.149	0.117	0.241	0.283	0.357	0.573	0.788	0.934	1.070	1.065	1.139	1.327
DCP 8	.200	0.156	0.203	0.560	0.564	0.390	0.926	0.710	0.887	1.191	1.250	1.117
DCP 9	.250	0.180	0.150	0.305	0.353	0.470	0.716	0.820	0.634	0.786	0.885	0.572
DCP10	.300	0.166	0.183	0.227	0.364	0.394	0.485	0.568	0.637	0.755	0.816	0.853
DCP11	.399	0.267	0.112	0.301	0.285	0.218	0.505	0.433	0.492	0.744	0.705	0.653
DCP12	.501	0.183	0.151	0.323	0.305	0.346	0.436	0.441	0.483	0.516	0.558	0.599
DCP13	.600	0.139	0.117	0.216	0.233	0.290	0.275	0.245	0.368	0.429	0.374	0.604
DCP14	.701	0.167	0.248	0.262	0.233	0.145	0.217	0.363	0.301	0.350	0.423	0.415
DCP15	.800	0.114	0.172	0.142	0.151	0.183	0.209	0.230	0.262	0.259	0.233	0.205
DCP16	.900	-0.075	-0.072	-0.057	-0.157	-0.107	-0.022	-0.113	0.002	-0.042	-0.029	0.030
DCP17	.969	-0.276		-0.239	-0.122	-0.040	-0.202	-0.105	-0.181	-0.179	-0.205	-0.062

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.199 Rn = 1.55 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		7.412	7.937	9.614	11.093	11.440	13.422	14.622	15.093	16.006	16.297	16.556
CN		0.744	0.840	0.989	1.042	1.097	1.137	1.175	1.145	0.934	0.922	0.916
CM		-0.003	-0.005	-0.006	0.001	0.006	0.014	0.005	-0.055	-0.075	-0.090	-0.084
DCP 1	.010	3.048	3.072	4.316	5.656	5.796	5.719	6.243	1.411	1.127	0.372	1.298
DCP 2	.020	2.586	3.475	3.630	4.085	4.444	4.804	4.621	2.665	1.603	1.540	1.642
DCP 3	.030	2.864	2.579	3.726	4.052	4.443	4.741	4.468	2.538	1.823	1.755	1.647
DCP 4	.049	2.364	2.545	3.122	3.260	3.676	3.668	4.016	3.746	3.020	3.081	3.042
DCP 5	.074	2.038	2.347	2.761	2.964	3.145	3.395	3.371	3.143	2.531	2.405	2.360
DCP 6	.099	1.921	2.229	2.617	2.728	2.904	3.029	3.025	2.691	2.174	2.146	1.962
DCP 7	.149	1.404	1.619	1.834	1.920	2.023	2.140	2.173	1.837	1.234	1.332	1.502
DCP 8	.200	1.223	1.386	1.458	1.773	1.743	1.874	1.794	2.101	1.301	1.233	1.256
DCP 9	.250	0.987	1.121	1.322	1.379	1.420	1.568	1.503	1.616	1.211	1.117	0.991
DCP10	.300	0.811	0.908	1.138	1.164	1.209	1.287	1.358	1.418	1.104	0.962	0.991
DCP11	.399	0.658	0.903	0.879	0.914	1.026	1.035	1.115	1.296	1.031	0.897	0.968
DCP12	.501	0.613	0.660	0.780	0.765	0.839	0.815	0.892	1.044	0.867	0.898	0.875
DCP13	.600	0.463	0.409	0.656	0.584	0.521	0.547	0.654	0.739	0.670	0.811	0.644
DCP14	.701	0.369	0.424	0.457	0.396	0.451	0.477	0.384	0.567	0.626	0.678	0.686
DCP15	.800	0.250	0.265	0.291	0.265	0.288	0.238	0.321	0.434	0.568	0.577	0.608
DCP16	.900	-0.049	-0.066	0.007	0.066	-0.007	0.012	0.058	0.221	0.291	0.335	0.239
DCP17	.969	-0.134	-0.063	-0.134	-0.059	-0.051	-0.138	-0.118	-0.152	-0.063	-0.061	0.035

DATA TYPE	X/C		
ALPHA		18.726	19.851
CN		0.965	0.939
CM		-0.096	-0.061
DCP 1	.010	0.254	1.566
DCP 2	.020	1.458	1.703
DCP 3	.030	1.734	1.663
DCP 4	.049	3.195	2.723
DCP 5	.074	2.474	2.769
DCP 6	.099	2.174	2.640
DCP 7	.149	1.447	1.668
DCP 8	.200	1.280	1.445
DCP 9	.250	1.0	1.046
DCP10	.300	0.959	0.964
DCP11	.399	1.111	0.996
DCP12	.501	1.007	0.841
DCP13	.600	0.729	0.671
DCP14	.701	0.770	0.564
DCP15	.800	0.621	0.503
DCP16	.900	0.237	0.203
DCP17	.969	0.015	-0.046

M = 0.2 $R_n = 3.2 \times 10^6$

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		-10.1	-8.68	-7.24	-5.72	-4.36	-3.01
CN		-0.638	-0.579	-0.491	-0.407	-0.293	-0.159
CM		-0.024	-0.030	-0.039	-0.036	-0.034	-0.032
DCP 1	.010	-2.416	-2.314	-5.054	-4.706	-3.603	-2.555
DCP 2	.020	1.809	2.008	1.091	1.580	2.221	2.888
DCP 3	.030	-2.866	-2.188	-2.287	-2.307	-1.822	-1.300
DCP 4	.049	-2.040	-2.399	-2.101	-1.700	-1.303	-0.867
DCP 5	.074	-1.897	-2.009	-1.625	-1.312	-0.964	-0.589
DCP 6	.099	-1.645	-1.579	-1.207	-0.917	-0.633	-0.329
DCP 7	.149	-1.475	-1.282	-0.927	-0.704	-0.497	-0.255
DCP 8	.200	-1.334	-1.165	-0.745	-0.575	-0.403	-0.204
DCP 9	.250	-1.084	-1.035	-0.618	-0.478	-0.321	-0.170
DCP10	.300	-0.828	-0.828	-0.464	-0.340	-0.216	-0.068
DCP11	.399	-0.552	-0.507	-0.333	-0.254	-0.174	-0.052
DCP12	.501	-0.398	-0.302	-0.284	-0.227	-0.161	-0.077
DCP13	.600	-0.186	-0.092	-0.110	-0.092	-0.046	0.019
DCP14	.701	-0.052	-0.0	-0.0	0.009	0.052	0.106
DCP15	.800	-0.009	0.009	0.009	-0.0	0.018	-0.045
DCP16	.900	-0.133	-0.113	-0.150	-0.160	-0.171	-0.153
DCP17	.969	0.206	0.354	0.426	0.484	0.507	0.5306
ALPHA		-1.643	-0.276	1.0[illegible]	2.458	3.831	5.197
CN		-0.039	0.090	0.209	0.3348	0.468	0.597
CM		-.030	-0.029	-0.026	-0.024	-0.023	-0.020
DCP 1	.010	-1.6[illegible]5	-0.775	0.059	0.873	1.698	2.537
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	-0.776	-0.250	0.293	0.853	1.446	2.034
DCP 4	.049	-0.440	0.006	0.436	0.904	1.390	1.860
DCP 5	.074	-0.248	0.125	0.479	0.848	1.228	1.628
DCP 6	.099	-0.036	0.271	0.556	0.865	1.185	1.506
DCP 7	.149	-0.040	0.211	0.425	0.668	0.871	1.134
DCP 8	.200	-0.027	0.162	0.336	0.523	0.720	0.918
DCP 9	.250	-0.024	0.140	0.291	0.453	0.625	0.789
DCP10	.300	0.061	0.199	0.340	0.460	0.612	0.749
DCP11	.399	0.042	0.158	0.254	0.363	0.474	0.573
DCP12	.501	0.0	0.096	0.167	0.239	0.330	0.412
DCP13	.600	0.076	0.124	0.183	0.242	0.303	0.363
DCP14	.701	0.142	0.189	0.226	0.274	0.322	0.360
DCP15	.800	0.073	0.101	0.111	0.140	0.178	0.198
DCP16	.900	-0.145	-0.137	-0.128	-0.119	-0.100	-0.090
DCP17	.969	0.526	0.444	0.350	0.294	0.296	0.228

M = 0.2 R_n = 3.2x10^6

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		6.564	7.920	9.291	10.65	12.185	13.53
CN		0.725	0.856	0.986	1.099	1.224	1.327
CM		-0.018	-0.015	-0.011	-0.008	-0.007	-
DCP 1	.010	3.348	4.271	5.266	5.860	6.056	6.599
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	2.568	3.166	3.753	4.304	4.928	5.471
DCP 4	.049	2.340	2.843	3.326	3.787	4.297	4.722
DCP 5	.074	2.005	2.395	2.780	3.148	3.560	3.896
DCP 6	.099	1.821	2.149	2.469	2.765	3.096	3.373
DCP 7	.149	1.382	1.640	1.876	2.090	2.351	2.556
DCP 8	.200	1.109	1.300	1.504	1.675	1.880	2.056
DCP 9	.250	0.946	1.113	1.273	1.430	1.608	1.743
DCP10	.300	0.879	1.018	1.143	1.264	1.405	1.522
DCP11	.399	0.695	0.797	0.899	0.999	1.112	1.193
DCP12	.501	0.503	0.578	0.662	0.735	0.820	0.887
DCP13	.600	0.414	0.475	0.527	0.577	0.629	0.662
DCP14	.701	0.399	0.438	0.477	0.497	0.536	0.547
DCP15	.800	0.218	0.238	0.258	0.268	0.288	0.299
DCP16	.900	-0.081	-0.071	-0.051	-0.051	-0.031	-0.020
DCP17	.969	0.209	0.230	0.221	0.181	0.040	-

ALPHA		14.85	16.19	17.53	18.88	20.14
CN		1.407	1.069	0.971	0.982	1.056
CM		0.002	-0.059	-0.070	-0.064	-0.079
DCP 1	.010	7.333	4.527	3.799	3.981	1.839
DCP 2	.020	-	-	-	-	-
DCP 3	.030	5.927	3.702	3.396	3.349	1.713
DCP 4	.049	5.038	3.326	2.794	2.639	3.729
DCP 5	.074	4.146	2.390	1.871	1.764	2.700
DCP 6	.099	3.557	1.783	1.402	1.486	2.052
DCP 7	.149	2.712	1.453	1.256	1.383	1.865
DCP 8	.200	2.192	1.284	1.122	1.244	1.275
DCP 9	.250	1.858	1.210	1.053	1.174	1.176
DCP10	.300	1.613	1.180	1.034	1.122	1.125
DCP11	.399	1.261	1.086	0.975	1.030	1.054
DCP12	.501	0.925	0.936	0.881	0.880	0.928
DCP13	.600	0.683	0.795	0.795	0.743	0.836
DCP14	.701	0.548	0.729	0.767	0.699	0.825
DCP15	.800	0.299	0.580	0.638	0.589	0.688
DCP16	.900	-0.020	0.267	0.288	0.277	0.319
DCP17	.969	-	-	-	-	-

M = 0.3 $R_n = 4.8 \times 10^6$

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		-9.78	-8.46	-7.12	-5.73	-4.369	-3.00
CN		-0.665	-0.582	-0.553	-0.448	-0.323	-0.192
CM		-0.012	-0.031	-0.031	-0.030	-0.028	-0.026
DCP 1	.010	-2.083	-2.357	-5.189	-4.747	-3.795	-2.690
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	-1.910	-2.409	-2.867	-2.391	-1.886	-1.353
DCP 4	.049	-2.127	-2.427	-2.114	-1.729	-1.312	-0.880
DCP 5	.074	-1.968	-2.189	-1.611	-1.289	-0.938	-0.585
DCP 6	.099	-1.798	-1.885	-1.255	-0.979	-0.685	-0.381
DCP 7	.149	-1.625	-1.434	- .982	-0.765	-0.539	-0.300
DCP 8	.200	-1.176	-0.932	-0.813	-0.635	-0.454	-0.261
DCP 9	.250	-1.108	-0.912	-0.685	-0.536	-0.374	-0.211
DCP10	.300	-1.026	-0.738	-0.546	-0.420	-0.279	-0.137
DCP11	.399	-0.736	-0.446	-0.410	-0.314	-0.200	-0.094
DCP12	.501	-0.471	-0.293	-0.339	-0.268	-0.188	-0.104
DCP13	.600	-0.240	-0.156	-0.220	-0.173	-0.113	-0.049
DCP14	.701	-0.041	-0.008	-0.045	-0.011	0.034	0.080
DCP15	.800	-0.015	-0.008	-0.031	-0.023	0.0	0.023
DCP16	.900	-0.086	-0.082	-0.131	-0.144	-0.136	-0.129
DCP17	.969	-	-	-	-	-	-
ALPHA		-1.64	-0.24	1.14	2.50	3.88	6.62
CN		-0.059	0.075	0.204	0.341	0.480	0.742
CM		-0.024	-0.023	-0.022	-0.021	-0.020	-0.016
DCP 1	.010	-1.69	-0.779	0.087	0.946	1.797	3.461
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	-0.795	-0.247	0.324	0.914	1.512	2.640
DCP 4	.049	-0.427	0.039	0.506	0.986	1.484	2.447
DCP 5	.074	-0.2105	0.183	0.547	0.940	1.336	2.105
DCP 6	.099	-0.062	0.261	0.578	0.906	1.245	1.881
DCP 7	.149	-0.059	0.185	0.420	0.665	0.900	1.409
DCP 8	.200	-0.062	0.140	0.323	0.528	0.739	1.137
DCP 9	.250	-0.049	0.124	0.289	0.458	0.640	0.965
DCP10	.300	0.003	0.152	0.292	0.436	0.584	0.866
DCP11	.399	0.022	0.136	0.245	0.360	0.481	0.700
DCP12	.501	-0.015	0.075	0.158	0.249	0.341	0.511
DCP13	.600	0.016	0.078	0.144	0.211	0.283	0.405
DCP14	.701	0.123	0.174	0.221	0.273	0.321	0.413
DCP15	.800	0.051	0.079	0.103	0.135	0.168	0.217
DCP16	.900	-0.117	-0.113	-0.114	-0.097	-0.072	-0.055
DCP17	.969	-	-	-	-	-	-

M = 0.3 $R_n = 4.8 \times 10^6$

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		7.982	9.35	10.71	12.27	13.79	15.22
CN		0.878	1.006	1.124	1.244	1.266	1.106
CM		-0.014	-0.011	-0.009	-0.002	0.011	-0.050
DCP 1	.010	4.406	5.204	5.804	7.051	7.698	4.823
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	3.260	3.874	4.426	4.994	5.265	3.708
DCP 4	.049	2.936	3.419	3.889	4.331	4.483	3.487
DCP 5	.074	2.499	2.886	3.246	3.601	3.720	2.621
DCP 6	.099	2.203	2.521	2.823	3.115	3.204	2.049
DCP 7	.149	1.659	1.894	2.117	2.340	2.415	1.601
DCP 8	.200	1.334	1.528	1.721	1.905	1.963	1.414
DCP 9	.250	1.138	1.297	1.455	1.613	1.662	1.313
DCP10	.300	1.000	1.138	1.260	1.390	1.419	1.233
DCP11	.399	0.812	0.923	1.022	1.115	1.117	1.138
DCP12	.501	0.600	0.680	0.761	0.827	0.809	0.953
DCP13	.600	0.469	0.528	0.583	0.625	0.580	0.784
DCP14	.701	0.457	0.497	0.525	0.541	0.467	0.686
DCP15	.800	0.242	0.266	0.278	0.283	0.247	0.499
DCP16	.900	-0.043	-0.034	-0.021	-0.017	0.009	0.241
DCP17	.969	-	-	-	-	-	-

ALPHA		16.66	18.15	19.65	20.19
CN		0.980	0.983	1.052	0.980
CM		-0.067	-0.065	-0.079	-0.070
DCP 1	.010	3.851	3.968	2.654	1.936
DCP 2	.020	-	-	-	-
DCP 3	.030	3.321	3.113	1.673	1.606
DCP 4	.049	2.764	2.561	3.272	3.238
DCP 5	.074	1.867	1.758	2.428	2.419
DCP 6	.099	1.459	1.520	1.973	1.967
DCP 7	.149	1.279	1.388	1.719	1.736
DCP 8	.200	1.172	1.286	1.499	1.286
DCP 9	.250	1.102	1.191	1.223	1.117
DCP10	.300	1.067	1.120	1.125	1.050
DCP11	.399	1.031	1.044	1.062	0.984
DCP12	.501	0.911	0.903	0.944	0.853
DCP13	.600	0.801	0.762	0.841	0.747
DCP14	.701	0.738	0.709	0.812	0.749
DCP15	.800	0.576	0.555	0.668	0.621
DCP16	.900	0.289	0.280	0.314	0.302
DCP17	.969	-	-	-	-

M = 0.4 $R_n = 6.3 \times 16^6$

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		-10.11	-8.48	-7.27	-4.20	-2.82	0.12
CN		-0.727	-0.598	-0.540	-0.336	-0.197	0.106
CM		0.003	-0.035	-0.035	-0.028	-0.026	-0.023
DCP 1	.010	-1.973	-2.450	-4.220	-4.002	-2.741	-0.591
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	-1.794	-3.081	-3.316	-1.918	-1.360	-0.106
DCP 4	.049	-2.318	-2.572	-2.347	-1.323	-0.862	0.169
DCP 5	.074	-2.087	-2.329	-1.691	-0.941	-0.561	0.309
DCP 6	.099	-1.824	-1.835	-1.346	-0.700	-0.575	0.346
DCP 7	.149	-1.510	-1.361	-1.029	-0.540	-0.293	0.257
DCP 8	.200	-1.163	-1.033	-0.762	-0.466	-0.266	0.176
DCP 9	.250	-1.148	-0.865	-0.687	-0.386	-0.215	0.167
DCP10	.300	-1.105	-0.698	-0.523	-0.295	-0.147	0.182
DCP11	.399	-0.886	-0.416	-0.411	-0.224	-0.106	0.153
DCP12	.501	-0.622	-0.303	-0.313	-0.187	-0.100	0.099
DCP13	.600	-0.359	-0.173	-0.185	-0.121	-0.056	0.092
DCP14	.701	-0.104	-0.006	-0.009	0.029	0.077	0.186
DCP15	.800	-0.060	-0.002	-0.004	-0.011	0.011	0.079
DCP16	.900	-0.115	-0.080	-0.092	-0.148	-0.144	-0.121
DCP17	.969	-	-	-	-	-	-
ALPHA		1.36	4.68	5.70	6.70	7.70	8.71
CN		0.235	0.578	0.683	0.783	0.884	0.985
CM		-0.021	-0.018	-0.017	-0.016	-0.013	-0.008
DCP 1	.010	0.215	2.313	2.968	3.642	4.481	5.731
DCP 2	.020	-	-	-	-	-	-
DCP 3	.030	0.438	1.951	2.420	2.837	3.295	3.720
DCP 4	.049	0.624	1.872	2.253	2.637	3.014	3.367
DCP 5	.074	0.659	1.664	1.964	2.266	2.562	2.846
DCP 6	.099	0.661	1.522	1.755	2.004	2.244	2.473
DCP 7	.149	0.503	1.207	1.298	1.490	1.668	1.841
DCP 8	.200	1.380	0.888	1.048	1.199	1.343	1.484
DCP 9	.250	1.334	1.759	1.894	1.016	1.138	1.255
DCP10	.300	0.316	0.682	0.794	0.901	1.004	1.101
DCP11	.399	1.263	0.559	0.645	0.728	0.810	0.886
DCP12	.501	0.183	0.411	0.482	0.544	0.605	0.664
DCP13	.600	0.154	0.323	0.378	0.428	0.473	0.514
DCP14	.701	0.236	0.359	0.394	0.425	0.455	0.477
DCP15	.800	0.105	0.178	0.201	0.222	0.238	0.249
DCP16	.900	-0.114	-0.082	-0.076	-0.066	-0.056	-0.051
DCP17	.969	-	-	-	-	-	-

M = 0.4

$R_n = 6.3 \times 16^6$

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENTS
FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C					
ALPHA		9.70	10.71	11.68	12.86	16.48
CN		1.055	1.086	1.086	1.017	1.015
CM		-0.004	0.002	0.012	0.009	-0.046
DCP 1	.010	6.421	6.566	5.922	4.593	3.688
DCP 2	.020	-	-	-	-	-
DCP 3	.030	3.956	4.364	5.065	4.876	3.175
DCP 4	.049	3.606	3.722	4.079	3.361	2.677
DCP 5	.074	3.059	3.170	3.238	2.939	2.398
DCP 6	.099	2.652	2.743	2.741	2.642	2.179
DCP 7	.149	1.986	2.071	2.101	2.129	1.727
DCP 8	.200	1.604	1.684	1.711	1.681	1.461
DCP 9	.250	1.359	1.418	1.432	1.379	1.298
DCP10	.300	1.182	1.229	1.229	1.158	1.144
DCP11	.399	0.947	0.975	0.961	0.918	1.004
DCP12	.501	0.710	0.720	0.698	0.653	0.840
DCP13	.600	0.540	0.533	0.486	0.437	0.673
DCP14	.701	0.477	0.445	0.379	0.335	0.602
DCP15	.800	0.243	0.215	0.176	0.200	0.491
DCP16	.900	-0.049	-0.053	-0.037	0.024	0.229
DCP17	.969	-	-	-	-	-

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENT
FLOOR AND CEILING WITH 4.5% POROSITY

DATA TYPE	X/C	M = 0.5 Rn = 7.9 x 10^6									
ALPHA		-9.99	-8.99	-8.16	-6.82	-5.89	-5.00	-4.10	-3.06	-2.04	-1.07
CN		-0.695	-0.670	-0.611	-0.508	-0.4[illegible]	-0.407	-0.319	-0.227	-0.119	-0.010
CM		-0.002	-0.022	-0.031	-0.035	-0.03[illegible]	-0.027	-0.020	-0.018	-0.018	-0.017
DCP 1	.010	-2.231	-2.568	-2.530	-3.983	4.257	-	-3.863	-3.417	-2.659	-1.637
DCP 2	.020	-2.933	-3.485	-3.561	-3.220	3.252	-3.028	-2.715	-2.095	-1.590	-1.035
DCP 3	.030	-2.619	-2.957	-2.954	-2.992	2.775	-2.668	-1.989	-1.567	-1.130	-0.688
DCP 4	.049	-2.052	-2.075	-2.492	-2.405	2.210	-2.046	-1.306	-0.986	-0.618	-0.257
DCP 5	.074	-1.821	-2.050	-2.269	-1.810	1.585	-1.423	-0.903	-0.630	-0.324	-0.029
DCP 6	.099	-1.740	-1.846	-1.722	1.392	1.142	-0.986	-0.692	-0.457	-0.193	0.059
DCP 7	.149	-1.545	-1.553	-1.321	1.039	0.820	-0.666	-0.537	-0.358	-0.163	0.032
DCP 8	.200	-1.189	-1.168	-1.051	0.791	0.683	-0.571	-0.465	-0.315	-0.149	0.013
DCP 9	.250	-1.161	-1.223	-1.058	0.655	0.565	-0.476	-0.380	-0.252	-0.110	0.024
DCP10	.300	-1.031	-1.012	-0.836	0.513	0.451	-0.375	-0.294	-0.185	-0.064	0.052
DCP11	.399	-0.777	-0.623	-0.476	0.380	0.340	-0.289	-0.228	-0.144	-0.048	0.045
DCP12	.501	-0.510	-0.368	-0.305	0.270	0.247	-0.216	-0.175	-0.114	-0.040	0.032
DCP13	.600	-0.277	-0.205	-0.161	0 [illegible]	0.132	-0.120	-0.095	-0.051	0.004	0.059
DCP14	.701	-0.062	-0.009	0.013	0.132	0.034	0.038	0.052	0.081	0.121	0.160
DCP15	.800	-0.036	0.005	0.021	0.026	0.016	0.008	0.006	0.015	0.038	0.062
DCP16	.900	-0.084	-0.053	-0.036	-0.039	-0.060	-0.082	-0.101	-0.117	-0.115	-0.108
DCP17	.969	-0.037	-0.017	-0.003	-0.006	-0.010	-0.022	-0.028	-0.041	-0.048	0.053

ALPHA		-0.05	0.99	1.95	2.97	4.0	4.94	6.00	6.99	7.95	8.97
CN		0.104	0.220	0.326	0.439	0.551	0.659	0.768	0.875	0.955	0.994
CM		-0.017	-0.017	-0.017	-0.017	-0.016	-0.0151	-0.013	-0.009	-0.007	0.000
DCP 1	.010	-0.948	-0.240	0.426	0.977	1.623	2.349	3.152	4.294	4.304	4.307
DCP 2	.020	-0.456	0.114	0.638	1.185	1.739	2.278	2.827	3.813	4.606	4.609
DCP 3	.030	-0.220	0.265	0.708	1.191	1.680	2.160	2.651	2.810	4.317	4.668
DCP 4	.049	0.143	0.549	0.929	1.352	1.778	2.199	2.663	3.187	3.196	3.198
DCP 5	.074	0.304	0.645	0.947	1.285	1.627	1.965	2.313	2.636	2.575	3.715
DCP 6	.099	0.335	0.620	0.879	1.166	1.454	1.722	2.003	2.260	2.419	2.271
DCP 7	.149	0.247	0.463	0.655	0.868	1.078	1.276	1.475	1.660	1.802	1.845
DCP 8	.200	0.172	0.359	0.519	0.691	0.859	1.016	1.176	1.327	1.445	1.512
DCP 9	.250	0.175	0.325	0.461	0.606	0.746	0.878	1.014	1.138	1.246	1.310
DCP10	.300	0.177	0.304	0.418	0.542	0.659	0.770	0.881	0.983	1.076	1.131
DCP11	.399	0.147	0.248	0.339	0.436	0.533	0.622	0.708	0.791	0.863	0.900
DCP12	.501	0.111	0.189	0.260	0.336	0.409	0.480	0.547	0.611	0.666	0.686
DCP13	.600	0.118	0.178	0.232	0.367	0.346	0.398	0.450	0.495	0.535	0.535
DCP14	.701	0.203	0.246	0.284	0.326	0.365	0.400	0.433	0.459	0.481	0.452
DCP15	.800	0.085	0.110	0.133	0.158	0.181	0.201	0.217	0.230	0.239	0.207
DCP16	.900	-0.102	-0.095	-0.088	-0.080	-0.073	-0.066	-0.061	-0.058	-0.057	-0.070
DCP17	.969	0.058	-0.064	-0.068	-0.071	-0.075	-0.078	-0.083	-0.086	-0.089	-0.095

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62
STEADY FORCES AND MOMENT
FLOOR AND CEILING WITH 4.5% POROSITY

DATA TYPE	X/C	M = 0.5 Rn = 7.9 x 10^6									
ALPHA		10.11	10.42	10.59	10.77	11.10	11.77	12.12	12.28	12.45	12.60
CN		1.044	1.063	1.060	1.070	1.012	0.997	1.013	0.999	0.992	1.001
CM		0.004	0.004	0.001	0.002	-0.001	-0.004	-0.009	-0.021	-0.010	-0.031
DCP 1	.010	4.309	4.324	4.322	4.318	4.318	4.322	4.317	3.575	4.320	3.105
DCP 2	.020	4.612	4.628	4.626	4.622	4.622	4.626	4.460	3.373	4.388	3.167
DCP 3	.030	4.670	4.686	4.685	4.680	4.680	4.685	4.680	4.120	3.557	4.119
DCP 4	.049	3.200	3.211	3.210	3.207	2.99	3.060	3.108	2.965	3.106	2.760
DCP 5	.074	3.453	3.461	3.353	3.422	2.613	2.489	2.600	2.576	2.605	2.506
DCP 6	.099	2.539	2.596	2.527	2.582	2.364	2.150	2.254	2.316	2.284	2.271
DCP 7	.149	1.941	1.962	1.909	1.939	1.930	1.974	1.943	1.884	2.058	1.880
DCP 8	.200	1.838	1.903	1.844	1.892	1.830	1.752	1.709	1.626	1.745	1.627
DCP 9	.250	1.646	1.730	1.730	1.752	1.664	1.547	1.548	1.538	1.495	1.549
DCP10	.300	1.318	1.372	1.385	1.416	1.323	1.266	1.291	1.342	1.229	1.337
DCP11	.399	0.957	0.982	1.014	1.015	0.948	0.957	0.971	1.033	0.938	1.034
DCP12	.501	0.678	0.692	0.707	0.708	0.681	0.685	0.696	0.735	0.677	0.775
DCP13	.600	0.479	0.481	0.483	0.479	0.477	0.480	0.497	0.522	0.491	0.570
DCP14	.701	0.361	0.349	0.355	0.343	0.351	0.357	0.379	0.399	0.384	0.443
DCP15	.800	0.171	0.171	0.179	0.171	0.176	0.200	0.230	0.262	0.242	0.279
DCP16	.900	-0.015	-0.006	0.001	0.004	-0.004	0.010	0.033	0.039	0.026	0.057
DCP17	.969	-0.045	-0.046	-0.045	-0.036	-0.054	-0.036	-0.027	-0.037	-0.036	-0.023

ALPHA		13.11	13.97	15.02	16.07	17.07	18.05	18.987	20.18
CN		0.998	0.974	0.983	0.998	0.991	1.007	1.011	1.044
CM		-0.033	-0.042	-0.052	-0.061	-0.081	-0.089	-0.093	-0.0921
DCP 1	.010	3.300	2.956	2.921	2.492	2.043	1.944	1.844	2.929
DCP 2	.020	3.034	2.809	2.888	2.677	2.077	1.996	1.957	3.063
DCP 3	.030	3.688	3.503	3.311	2.953	2.368	2.196	2.194	2.424
DCP 4	.049	3.109	2.845	2.889	2.726	2.629	2.813	2.727	2.376
DCP 5	.074	2.529	2.316	2.243	2.229	2.370	2.397	2.373	2.076
DCP 6	.099	2.223	2.044	1.909	2.031	2.076	2.067	2.104	1.891
DCP 7	.149	1.891	1.795	1.755	1.866	1.833	1.815	1.805	1.710
DCP 8	.200	1.566	1.554	1.575	1.579	1.329	1.332	1.329	1.537
DCP 9	.250	1.481	1.464	1.448	1.445	1.259	1.264	1.257	1.385
DCP10	.300	1.293	1.271	1.268	1.282	1.162	1.164	1.170	1.320
DCP11	.399	1.041	1.017	1.040	1.057	1.047	1.074	1.067	1.169
DCP12	.501	0.779	0.784	0.797	0.862	0.900	0.958	0.952	0.981
DCP13	.600	0.569	0.614	0.628	0.675	0.754	0.807	0.822	0.820
DCP14	.701	0.441	0.486	0.530	0.571	0.667	0.713	0.734	0.702
DCP15	.800	0.308	0.315	0.387	0.402	0.511	0.530	0.560	0.538
DCP16	.900	0.071	0.087	0.125	0.138	0.196	0.202	0.218	0.223
DCP17	.969	-0.021	0.000	-0.003	0.001	0.010	0.015	0.026	0.042

AIRFOIL NLR 7223-[illegible] STEADY FORCES AND MOMENTS

M = 0.592 Rn = 3.2 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		-9.712	-9.191	-8.286	-7.882	-7.315	-6.832	-5.886	-5.435	-5.077	-4.225	-3.524
CN		-0.576	-0.591	-0.587	-0.558	-0.537	-0.495	-0.464	-0.423	-0.376	-0.317	-0.259
CM		0.016	0.008	-0.005	-0.014	-0.023	-0.034	-0.036	-0.042	-0.038	-0.030	-0.027
DCP 1	.010	-1.563	-1.505	-1.576	-1.546	-1.564	-1.589	-1.666	-1.634	-1.643	-1.745	-1.755
DCP 2	.020	-1.420	-1.437	-1.482	-1.480	-1.465	-1.488	-1.536	-1.558	-1.547	-1.614	-1.641
DCP 3	.030	-2.656	-2.776	-2.825	-2.762	-2.717	-2.735	-2.728	-2.695	-2.589	-2.496	-2.387
DCP 4	.049	-0.870	-0.946	-1.043	-1.035	-1.059	-1.082	-1.093	-1.143	-1.158	-1.197	-0.995
DCP 5	.074	-1.334	-1.545	-1.587	-1.604	-1.682	-1.639	-1.633	-1.669	-1.653	-1.451	-1.052
DCP 6	.099	-1.182	-1.393	-1.454	-1.492	-1.544	-1.573	-1.538	-1.539	-1.447	-1.126	-0.763
DCP 7	.149	-1.101	-1.233	-1.333	-1.299	-1.338	-1.319	-1.298	-1.320	-1.097	-0.608	-0.493
DCP 8	.200	-1.067	-1.164	-1.237	-1.251	-1.296	-1.199	-1.176	-1.018	-0.735	-0.545	-0.424
DCP 9	.250	-0.992	-1.086	-1.121	-1.087	-1.082	-1.044	-0.872	-0.750	-0.551	-0.421	-0.345
DCP10	.300	-0.853	-0.887	-0.867	-0.840	-0.785	-0.689	-0.608	-0.467	-0.418	-0.335	-0.276
DCP11	.395	-0.755	-0.595	-0.624	-0.558	-0.536	-0.452	-0.379	-0.290	-0.263	-0.233	-0.191
DCP12	.501	-0.498	-0.474	-0.452	-0.390	-0.330	-0.304	-0.231	-0.201	-0.175	-0.168	-0.157
DCP13	.600	-0.318	-0.295	-0.276	-0.251	-0.131	-0.111	-0.064	-0.064	-0.062	-0.070	-0.055
DCP14	.701	-0.095	-0.082	-0.023	0.010	0.024	0.083	0.082	0.121	0.110	0.103	0.115
DCP15	.800	-0.029	-0.098	-0.007	0.037	0.044	0.100	0.069	0.076	0.072	0.069	0.079
DCP16	.900	-0.170	-0.118	-0.058	-0.076	-0.049	-0.042	-0.041	-0.033	-0.066	-0.085	-0.094
DCP17	.969	-0.066	-0.049	-0.025	0.036	-0.012	0.037	0.001	0.026	0.026	-0.001	-0.011

DATA TYPE	X/C										
ALPHA		-3.035	-2.565	-1.671	-1.094	-0.823	-0.152	0.751	1.284	1.565	2.350	3.357
CN		-0.205	-0.136	-0.086	-0.023	0.045	0.106	0.166	0.235	0.295	0.363	0.434
CM		-0.024	-0.025	-0.017	-0.018	-0.020	-0.016	-0.015	-0.014	-0.013	-0.012	-0.013
DCP 1	.010	-1.737	-1.610	-1.393	-1.103	-0.815	-0.517	-0.285	-0.027	0.237	0.443	0.676
DCP 2	.020	-1.598	-1.439	-1.155	-0.801	-0.574	-0.360	-0.173	-0.002	0.237	0.440	0.604
DCP 3	.030	-2.285	-1.603	-1.062	-0.925	-0.616	-0.344	-0.024	0.264	0.558	0.837	1.165
DCP 4	.049	-0.683	-0.495	-0.392	-0.240	-0.118	0.021	0.165	0.345	0.493	0.635	0.817
DCP 5	.074	-0.718	-0.506	-0.311	-0.126	0.060	0.257	0.480	0.705	0.904	1.139	1.414
DCP 6	.099	-0.526	-0.391	-0.228	-0.034	0.141	0.285	0.472	0.685	0.859	1.043	1.287
DCP 7	.149	-0.403	-0.263	-0.156	-0.051	0.115	0.248	0.358	0.504	0.675	0.830	0.558
DCP 8	.200	-0.385	-0.257	-0.185	-0.064	0.001	0.163	0.278	0.391	0.441	0.596	0.708
DCP 9	.250	-0.270	-0.211	-0.102	-0.026	0.079	0.184	0.261	0.365	0.459	0.544	0.636
DCP10	.300	-0.202	-0.134	-0.073	0.013	0.073	0.175	0.253	0.315	0.397	0.478	0.545
DCP11	.399	-0.158	-0.071	-0.033	0.012	0.084	0.152	0.203	0.274	0.328	0.390	0.465
DCP12	.501	-0.136	-0.074	-0.020	0.029	0.069	0.107	0.158	0.207	0.234	0.294	0.336
DCP13	.600	-0.023	0.007	0.038	0.067	0.117	0.144	0.179	0.202	0.235	0.279	0.300
DCP14	.701	0.131	0.144	0.153	0.174	0.214	0.205	0.254	0.269	0.276	0.313	0.312
DCP15	.800	0.054	0.085	0.062	0.072	0.102	0.102	0.088	0.107	0.140	0.121	0.143
DCP16	.900	-0.084	-0.083	-0.131	-0.135	-0.107	-0.111	-0.110	-0.119	-0.142	0.133	-0.092
DCP17	.969	-0.017	0.017	-0.021	-0.024	-0.022	-0.063	-0.058	-0.052	-0.036	-0.057	-0.048

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

REPRODUCIBILITY OF THE

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.592 Rn = 3.2 x 10^6

DATA TYPE	X/C										
ALPHA		3.58C	4.11S	4.88S	5.693	5.837	6.545	7.553	7.823	8.448	9.16S	9.544
CN		0.495	0.549	0.600	0.684	0.755	0.803	0.832	0.844	0.884	0.887	0.917
CM		-0.012	-0.008	-0.005	-0.00C	0.002	0.004	0.012	0.014	0.C08	0.010	0.000
DCP 1	.010	0.916	1.14C	1.315	1.515	1.771	1.895	1.995	2.075	2.154	2.214	2.263
DCP 2	.020	0.79C	1.002	1.166	1.268	1.430	1.651	1.785	1.847	1.965	2.059	2.C81
DCP 3	.030	1.458	1.703	1.918	2.117	2.315	2.588	2.853	3.000	3.147	3.283	3.366
DCP 4	.049	C.999	1.173	1.285	1.411	1.507	1.563	1.683	1.782	1.864	1.828	1.854
DCP 5	.074	1.678	1.973	2.237	2.454	2.625	2.708	2.838	2.937	2.877	2.897	2.811
DCP 6	.099	1.521	1.761	2.062	2.351	2.581	2.657	2.716	2.725	2.735	2.505	2.426
DCP 7	.149	0.913	0.988	1.106	1.865	2.282	2.442	2.398	2.134	2.075	2.C92	2.136
DCP 8	.200	0.785	0.892	0.950	0.966	1.123	1.454	1.68C	1.758	1.768	1.757	1.895
DCP 9	.250	0.737	0.801	0.855	0.902	C.955	1.028	1.224	1.406	1.505	1.582	1.669
DCP10	.300	0.642	0.721	0.772	0.806	0.850	C.85C	0.943	1.059	1.173	1.256	1.247
DCP11	.399	0.534	0.565	0.594	0.659	0.705	0.733	0.7C2	0.741	0.856	C.885	C.887
DCP12	.501	0.398	0.438	0.446	0.501	0.534	0.519	0.548	0.534	0.572	0.577	0.627
DCP13	.600	0.355	0.358	0.375	0.418	0.445	0.449	0.414	0.432	0.427	0.449	0.464
DCP14	.701	0.348	0.371	0.375	0.360	0.356	0.395	0.364	0.321	0.334	0.315	0.326
DCP15	.800	0.146	0.140	0.166	0.176	0.159	0.176	0.155	0.133	0.152	0.119	0.158
DCP16	.900	-0.124	-0.124	-0.118	-0.127	-0.116	-0.087	-0.C9E	-0.099	-0.C86	-0.C96	-0.027
DCP17	.969	-0.061	-0.086	-0.C89	-0.083	-0.C8C	-0.076	-0.105	-0.081	-0.060	-0.C77	-0.030

DATA TYPE	X/C										
ALPHA		10.214	10.808	11.651	12.259	12.544	13.115	14.013	14.517	15.061	15.504	16.326
CN		0.936	0.906	0.915	0.932	0.904	0.832	0.824	0.814	0.841	0.849	0.857
CM		-0.013	-0.025	-0.045	-0.060	-0.C74	-0.071	-0.079	-0.C74	-0.077	-0.C76	-0.C79
DCP 1	.010	2.267	2.293	1.971	1.811	1.482	1.244	1.125	1.150	1.146	1.115	1.112
DCP 2	.020	2.121	2.094	1.833	1.616	1.367	1.136	1.042	1.C03	1.037	1.035	1.037
DCP 3	.030	3.337	3.255	2.773	2.666	2.096	1.836	1.710	1.663	1.644	1.637	1.675
DCP 4	.049	1.828	1.672	1.657	1.667	1.741	1.70C	1.677	1.602	1.597	1.562	1.570
DCP 5	.074	2.680	2.501	2.481	2.448	2.472	2.465	2.484	2.452	2.472	2.449	2.495
DCP 6	.C99	2.381	2.133	2.163	2.196	2.281	2.242	2.231	2.193	2.264	2.255	2.353
DCP 7	.149	2.070	1.894	1.732	1.733	1.607	1.402	1.237	1.310	1.419	1.497	1.435
DCP 8	.200	1.821	1.665	1.471	1.424	1.140	0.956	0.943	1.022	1.C08	1.117	1.C55
DCP 9	.250	1.553	1.483	1.328	1.347	1.165	1.057	0.981	0.998	1.C35	1.04C	1.027
DCP10	.300	1.267	1.26C	1.166	1.173	1.042	0.949	0.916	0.889	0.930	0.955	0.978
DCP11	.399	0.968	0.951	1.05C	1.027	1.020	0.89C	0.845	0.847	0.891	0.935	0.898
DCP12	.501	0.718	0.691	0.835	0.846	0.83C	0.730	0.744	0.757	0.78C	0.777	0.788
DCP13	.600	0.510	0.533	0.641	0.682	0.740	0.668	0.721	0.673	0.693	0.687	0.714
DCP14	.701	0.405	0.406	0.539	0.605	0.645	0.645	0.657	.620	0.675	0.667	0.658
DCP15	.803	0.197	0.265	0.376	0.395	0.465	0.501	0.553	0.514	0.532	0.507	0.524
DCP16	.900	-0.007	0.048	0.C55	0.079	0.156	0.160	0.177	0.168	0.143	0.164	0.162
DCP17	.969	-0.033	-0.024	-0.011	C.020	0.016	-0.029	-0.005	-0.014	0.006	-0.017	-0.017

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.592 Rn = 3.2 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		16.865	17.468	17.960	18.862	19.336	19.918
CN		0.878	0.911	0.932	0.952	0.585	0.987
CM		-0.075	-0.083	-0.091	-0.091	-0.096	-0.097
DCP 1	.010	1.145	1.153	1.147	1.152	1.184	1.189
DCP 2	.020	1.028	1.071	1.089	1.108	1.095	1.119
DCP 3	.030	1.711	1.731	1.736	1.610	1.830	1.814
DCP 4	.049	1.625	1.631	1.587	1.495	1.512	1.477
DCP 5	.074	2.471	2.527	2.534	2.487	2.486	2.441
DCP 6	.099	2.405	2.424	2.387	2.456	2.518	2.461
DCP 7	.149	1.585	1.740	1.786	1.805	1.570	2.080
DCP 8	.200	1.086	1.155	1.132	1.251	1.297	1.243
DCP 9	.250	1.088	1.129	1.146	1.185	1.225	1.235
DCP10	.300	0.993	1.041	1.043	1.104	1.135	1.138
DCP11	.399	0.917	0.937	0.979	1.025	1.057	1.066
DCP12	.501	0.811	0.835	0.876	0.889	0.917	0.918
DCP13	.600	0.735	0.739	0.763	0.802	0.797	0.819
DCP14	.701	0.669	0.688	0.727	0.730	0.755	0.740
DCP15	.800	0.544	0.562	0.586	0.594	0.603	0.605
DCP16	.900	0.188	0.190	0.226	0.230	0.242	0.257
DCP17	.969	-0.008	-0.000	0.025	0.012	0.016	0.004

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.594 Rn = 6.3 x 10^6

DATA TYPE	X/C										
ALPHA		-9.529	-8.528	-8.253	-7.742	-7.127	-6.253	-5.505	-5.341	-4.820	-4.010	-3.568
CN		-0.675	-0.671	-0.598	-0.573	-0.550	-0.495	-0.465	-0.435	-0.366	-0.314	-0.269
CM		0.015	0.007	-0.016	-0.028	-0.032	-0.040	-0.038	-0.036	-0.031	-0.026	-0.022
DCP 1	.010	-2.076	-1.931	-1.777	-2.137	-1.697	-1.748	-1.649	-1.780	-1.675	-2.002	-2.021
DCP 2	.020	-1.835	-1.614	-1.624	-1.829	-1.608	-1.619	-1.552	-1.630	-1.760	-1.807	-1.747
DCP 3	.030	-2.790	-3.164	-3.018	-2.796	-3.005	-2.827	-2.412	-2.758	-2.667	-2.628	-2.386
DCP 4	.049	-1.337	-1.255	-1.303	-1.416	-1.421	-1.396	-1.295	-1.192	-1.308	-1.195	-0.948
DCP 5	.074	-1.037	-1.902	-1.829	-1.856	-1.996	-1.995	-1.961	-1.801	-1.647	-1.298	-0.935
DCP 6	.099	-1.705	-1.773	-1.585	-1.641	-1.715	-1.675	-1.641	-1.567	-1.221	-0.875	-0.631
DCP 7	.149	-1.433	-1.576	-1.469	-1.433	-1.430	-1.388	-1.375	-1.211	-0.810	-0.618	-0.512
DCP 8	.200	-0.999	-1.062	-1.191	-1.088	-1.272	-1.092	-1.063	-0.946	-0.626	-0.478	-0.424
DCP 9	.250	-0.975	-1.062	-1.105	-1.018	-0.987	-0.882	-0.773	-0.736	-0.447	-0.410	-0.364
DCP10	.300	-0.899	-0.868	-0.842	-0.582	-0.728	-0.623	-0.568	-0.486	-0.416	-0.311	-0.267
DCP11	.399	-0.756	-0.627	-0.609	-0.574	-0.443	-0.393	-0.352	-0.268	-0.268	-0.244	-0.179
DCP12	.501	-0.616	-0.490	-0.425	-0.361	-0.333	-0.257	-0.203	-0.226	-0.208	-0.175	-0.149
DCP13	.600	-0.360	-0.442	-0.271	-0.130	-0.183	-0.096	-0.103	0.079	-0.074	-0.093	-0.071
DCP14	.701	-0.227	-0.128	-0.007	0.032	0.081	0.087	0.062	0.058	0.059	0.073	0.072
DCP15	.800	-0.068	-0.090	0.017	0.061	0.050	0.068	0.067	0.066	0.043	0.029	0.033
DCP16	.900	-0.138	-0.121	-0.048	-0.062	-0.062	-0.023	-0.023	-0.051	-0.055	-0.067	-0.083
DCP17	.969	-0.064	-0.068	-0.000	0.020	0.014	0.009	0.008	-0.009	0.004	-0.014	-0.015

DATA TYPE	X/C										
ALPHA		-2.942	-2.333	-1.405	-1.093	-0.481	0.236	0.838	1.211	1.851	2.804	3.236
CN		-0.210	-0.149	-0.088	-0.024	0.044	0.117	0.178	0.245	0.312	0.376	0.444
CM		-0.019	-0.018	-0.015	-0.014	-0.015	-0.014	-0.015	-0.015	-0.013	-0.013	-0.012
DCP 1	.010	-1.925	-1.758	-1.501	-1.123	-0.795	-0.518	-0.252	0.001	0.229	0.447	0.687
DCP 2	.020	-1.717	-1.533	-0.803	-0.776	-0.561	-0.352	-0.166	0.053	0.254	0.439	0.632
DCP 3	.030	-1.572	-1.320	-1.105	-0.875	-0.602	-0.285	0.007	0.312	0.601	0.904	1.196
DCP 4	.049	-0.857	-0.533	-0.396	-0.267	-0.106	0.030	0.186	0.341	0.502	0.665	0.846
DCP 5	.074	-0.675	-0.503	-0.320	-0.141	0.082	0.325	0.507	0.727	0.973	1.213	1.474
DCP 6	.099	-0.511	-0.364	-0.192	-0.012	0.156	0.355	0.536	0.731	0.963	1.141	1.363
DCP 7	.149	-0.400	-0.279	-0.16	-0.024	0.102	0.248	0.381	0.527	0.681	0.746	0.880
DCP 8	.200	-0.349	-0.241	-0.144	-0.041	0.076	0.210	0.295	0.402	0.524	0.638	0.765
DCP 9	.250	-0.289	-0.180	-0.103	-0.008	0.068	0.169	0.264	0.361	0.464	0.547	0.651
DCP10	.300	-0.195	-0.140	-0.065	0.020	0.109	0.180	0.260	0.340	0.414	0.525	0.586
DCP11	.399	-0.148	-0.099	-0.037	0.028	0.095	0.160	0.228	0.284	0.358	0.410	0.476
DCP12	.501	-0.112	-0.077	-0.039	0.017	0.062	0.126	0.174	0.213	0.267	0.305	0.344
DCP13	.600	-0.040	-0.013	0.028	0.058	0.099	0.141	0.166	0.202	0.234	0.267	0.294
DCP14	.701	0.075	0.111	0.134	0.152	0.175	0.196	0.230	0.255	0.270	0.306	0.322
DCP15	.800	0.041	0.061	0.044	0.056	0.092	0.083	0.105	0.125	0.131	0.121	0.153
DCP16	.900	-0.103	-0.103	-0.112	-0.120	-0.122	-0.113	-0.105	-0.107	-0.110	-0.107	-0.098
DCP17	.969	-0.014	-0.027	-0.030	-0.032	-0.052	-0.061	-0.062	-0.056	-0.072	-0.053	-0.073

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.594 Rn = 6.3 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		3.647	4.318	5.186	5.457	5.573	6.784	7.601	7.674	8.336	9.215	9.932
CN		C.514	0.582	0.631	0.711	0.771	0.828	0.871	0.901	C.886	0.906	0.892
CM		-0.012	-0.009	-0.006	-0.004	-0.000	0.002	0.008	0.013	0.016	0.013	0.011
DCP 1	.010	0.923	1.134	1.328	1.552	1.768	1.927	2.021	2.103	2.163	2.191	2.228
DCP 2	.020	0.849	1.019	1.163	1.306	1.480	1.716	1.836	1.937	2.006	2.054	2.091
DCP 3	.030	1.486	1.734	1.971	2.149	2.303	2.713	2.950	3.115	3.211	3.302	3.377
DCP 4	.049	1.033	1.182	1.306	1.416	1.472	1.601	1.722	1.827	1.893	1.931	1.948
DCP 5	.074	1.746	2.045	2.311	2.507	2.609	2.750	2.921	3.069	3.146	3.146	3.072
DCP 6	.099	1.597	1.981	2.365	2.580	2.699	2.828	2.977	3.078	2.989	2.990	2.585
DCP 7	.149	1.035	1.104	1.104	1.875	2.438	2.591	2.676	2.554	2.215	2.176	2.082
DCP 8	.200	0.838	0.955	C.997	0.995	1.121	1.423	1.654	1.742	1.825	1.833	1.802
DCP 9	.250	C.738	0.825	0.889	0.914	0.911	C.986	1.171	1.391	1.386	1.462	1.526
DCP10	.300	0.660	0.736	0.777	0.813	0.853	0.832	0.832	1.033	1.083	1.177	1.183
DCP11	.399	0.541	0.620	0.642	0.683	0.708	0.754	0.764	0.762	0.792	0.827	0.862
DCP12	.501	0.393	0.437	0.475	0.516	0.528	0.565	0.564	0.570	0.532	0.548	C.569
DCP13	.600	0.351	C.379	0.411	0.418	0.443	0.463	0.466	0.451	0.413	0.423	0.415
DCP14	.701	0.350	0.367	0.368	0.398	0.407	0.398	0.399	0.361	0.339	0.319	C.308
DCP15	.800	0.161	0.162	0.175	0.195	0.198	0.230	0.196	0.170	0.153	0.156	0.169
DCP16	.900	-0.087	-0.105	-0.119	-0.099	-0.093	-0.076	-0.086	-0.091	-0.097	-0.069	-0.062
DCP17	.969	-0.092	-0.080	-0.072	-0.083	-0.078	-0.073	-0.083	-0.087	-0.078	-0.067	-0.108

DATA TYPE	X/C										
ALPHA		10.275	10.695	11.600	12.432	12.608	13.172	14.078	14.820	15.038	15.615	16.221
CN		0.902	0.898	0.936	0.928	0.965	0.942	0.921	0.865	0.850	0.886	0.927
CM		0.000	-0.006	-0.025	-0.041	-0.064	-0.068	-0.075	-0.083	-0.082	-0.091	-0.093
DCP 1	.010	2.268	2.297	2.274	2.160	1.957	1.774	1.959	2.082	2.103	2.125	2.144
DCP 2	.020	2.139	2.170	2.139	1.980	1.786	1.594	1.880	2.104	2.088	2.045	2.023
DCP 3	.030	3.417	3.318	3.258	3.205	2.985	2.678	3.343	3.401	3.224	2.993	2.956
DCP 4	.049	1.901	1.735	1.795	1.631	1.715	1.636	1.685	1.626	1.611	1.620	1.665
DCP 5	.074	2.757	2.477	2.608	2.459	2.580	2.546	2.616	1.955	2.057	2.260	2.481
DCP 6	.099	2.375	2.295	2.294	2.283	2.406	2.337	2.374	1.409	1.371	1.413	1.503
DCP 7	.149	2.052	2.090	1.930	1.677	1.667	1.631	1.357	1.246	1.200	1.208	1.316
DCP 8	.200	1.788	1.770	1.629	1.383	1.394	1.278	1.114	1.138	1.096	1.142	1.219
DCP 9	.250	1.565	1.456	1.418	1.411	1.269	1.205	1.011	1.082	1.026	1.072	1.154
DCP10	.300	1.229	1.233	1.268	1.275	1.160	1.156	1.019	1.031	0.994	1.047	1.084
DCP11	.399	0.946	1.011	1.075	1.132	1.117	1.035	0.938	0.917	0.937	0.945	1.012
DCP12	.501	0.629	0.635	0.763	0.792	0.902	0.925	0.867	0.831	0.757	0.824	0.882
DCP13	.600	0.414	0.458	0.584	0.605	0.700	0.704	0.713	0.705	0.658	0.800	0.852
DCP14	.701	0.320	0.345	0.420	0.491	0.613	0.594	0.644	0.685	0.616	0.680	0.605
DCP15	.800	0.184	0.184	0.223	0.310	0.386	0.449	0.516	0.499	0.488	0.538	0.585
DCP16	.900	-0.025	-0.028	0.042	0.071	0.170	0.172	0.241	0.234	0.313	0.275	0.284
DCP17	.969	-0.066	-0.057	-0.040	-0.057	0.006	0.004	0.051	0.088	0.097	0.056	0.066

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.594 Rn = 6.3 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C						
ALPHA		17.060	17.356	18.048	18.665	19.471	19.856
CN		0.906	0.929	0.946	0.943	1.005	0.995
CM		-0.092	-0.096	-0.095	-0.092	-0.106	-0.105
DCP 1	.010	2.125	2.157	2.177	2.190	2.201	2.187
DCP 2	.020	1.950	2.026	2.000	2.066	2.049	2.025
DCP 3	.030	2.863	2.946	2.864	2.898	2.883	2.829
DCP 4	.049	1.640	1.664	1.682	1.681	1.732	1.708
DCP 5	.074	2.506	2.620	2.721	2.753	2.880	2.851
DCP 6	.099	1.464	1.464	1.496	1.541	1.594	1.624
DCP 7	.149	1.248	1.285	1.312	1.351	1.398	1.398
DCP 8	.200	1.185	1.210	1.250	1.250	1.330	1.305
DCP 9	.250	1.132	1.110	1.156	1.183	1.237	1.251
DCP10	.300	1.034	1.070	1.131	1.104	1.146	1.168
DCP11	.399	0.987	1.000	1.033	0.995	1.076	1.081
DCP12	.501	0.804	0.853	0.896	0.907	0.986	0.946
DCP13	.600	0.762	0.820	0.832	0.737	0.892	0.836
DCP14	.731	0.753	0.704	0.740	0.699	0.771	0.835
DCP15	.800	0.579	0.596	0.582	0.609	0.619	0.625
DCP16	.900	0.241	0.301	0.260	0.271	0.318	0.281
DCP17	.969	0.074	0.067	0.033	0.062	0.079	0.065

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 9.4 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		-8.647	-8.153	-7.394	-7.197	-6.582	-5.789	-5.041	-4.676	-4.040	-3.413	-2.519
CN		-0.662	-0.630	-0.563	-0.577	-0.522	-0.483	-0.457	-0.407	-0.350	-0.298	-0.237
CM		-0.019	-0.027	-0.040	-0.049	-0.050	-0.049	-0.044	-0.041	-0.035	-0.030	-0.027
DCP 1	.010	-2.693	-2.696	-3.038	-3.216	-3.145	-3.279	-3.268	-3.374	-3.337	-3.401	-3.414
DCP 2	.020	-3.079	-2.941	-3.229	-3.017	-3.060	-3.097	-2.836	-3.011	-3.015	-3.018	-2.577
DCP 3	.030	-2.655	-2.633	-2.616	-2.806	-2.662	-2.572	-2.694	-2.708	-2.491	-2.320	-1.804
DCP 4	.049	-2.329	-2.264	-1.992	-2.466	-2.394	-2.224	-2.117	-2.237	-1.932	-1.554	-1.046
DCP 5	.074	-1.880	-1.931	-1.814	-2.125	-2.043	-1.974	-1.817	-1.583	-1.283	-0.895	-0.662
DCP 6	.099	-1.737	-1.732	-1.657	-1.796	-1.830	-1.701	-1.525	-1.202	-0.841	-0.628	-0.477
DCP 7	.149	-1.301	-1.392	-1.570	-1.402	-1.241	-1.142	-1.114	-0.797	-0.606	-0.461	-0.406
DCP 8	.200	-1.116	-1.147	-1.084	-1.138	-0.991	-0.866	-0.680	-0.585	-0.518	-0.436	-0.350
DCP 9	.250	-1.176	-1.057	-0.902	-0.935	-0.715	-0.604	-0.564	-0.495	-0.405	-0.346	-0.274
DCP10	.300	-0.978	-0.855	-0.662	-0.695	-0.563	-0.473	-0.443	-0.359	-0.321	-0.270	-0.184
DCP11	.399	-0.655	-0.625	-0.416	-0.428	-0.375	-0.305	-0.307	-0.273	-0.237	-0.184	-0.136
DCP12	.501	-0.419	-0.384	-0.313	-0.260	-0.242	-0.227	-0.214	-0.188	-0.162	-0.141	-0.096
DCP13	.600	-0.280	-0.229	-0.144	-0.117	-0.108	-0.108	-0.106	-0.095	-0.079	-0.060	-0.038
DCP14	.701	-0.029	0.006	0.046	0.062	0.083	0.092	0.076	0.081	0.076	0.083	0.101
DCP15	.800	-0.028	0.017	0.045	0.045	0.058	0.055	0.040	0.035	0.040	0.031	0.027
DCP16	.900	-0.065	-0.060	-0.041	-0.025	-0.021	-0.032	-0.032	-0.069	-0.086	-0.057	-0.107
DCP17	.969	-0.019	-0.017	-0.017	0.008	0.012	-0.014	-0.032	-0.006	-0.004	-0.024	-0.016

DATA TYPE	X/C										
ALPHA		-2.356	-1.647	-1.152	-0.321	0.201	0.591	1.320	2.157	2.505	3.031	3.854
CN		-0.180	-0.112	-0.042	0.031	0.110	0.175	0.250	0.322	0.398	0.468	0.539
CM		-0.022	-0.021	-0.018	-0.016	-0.017	-0.015	-0.014	-0.013	-0.011	-0.009	-0.006
DCP 1	.010	-3.385	-2.821	-2.651	-1.537	-0.917	-0.371	-0.268	0.112	0.613	1.020	1.265
DCP 2	.020	-2.202	-1.551	-1.265	-0.504	-0.562	-0.215	0.125	0.453	0.780	1.114	1.435
DCP 3	.030	-1.308	-1.142	-0.854	-0.556	-0.265	0.012	0.313	0.616	0.905	1.191	1.472
DCP 4	.049	-0.857	-0.657	-0.421	-0.175	0.103	0.331	0.586	0.850	1.134	1.419	1.717
DCP 5	.074	-0.515	-0.335	-0.143	0.074	0.278	0.493	0.737	0.956	1.195	1.434	1.722
DCP 6	.099	-0.338	-0.176	-0.025	0.168	0.350	0.540	0.726	0.927	1.126	1.322	1.553
DCP 7	.149	-0.284	-0.154	-0.027	0.085	0.238	0.378	0.518	0.643	0.792	0.925	1.053
DCP 8	.200	-0.266	-0.156	-0.056	0.065	0.184	0.283	0.410	0.524	0.632	0.733	0.834
DCP 9	.250	-0.192	-0.117	-0.017	0.078	0.177	0.289	0.364	0.462	0.553	0.646	0.734
DCP10	.300	-0.140	-0.054	0.026	0.115	0.191	0.246	0.358	0.428	0.510	0.591	0.658
DCP11	.399	-0.075	-0.028	0.041	0.131	0.161	0.233	0.292	0.360	0.436	0.480	0.529
DCP12	.501	-0.072	-0.015	0.027	0.076	0.125	0.155	0.211	0.264	0.295	0.360	0.412
DCP13	.600	-0.014	0.007	0.052	0.078	0.132	0.157	0.208	0.237	0.267	0.301	0.337
DCP14	.701	0.121	0.145	0.162	0.187	0.230	0.261	0.264	0.296	0.319	0.342	0.368
DCP15	.800	0.037	0.048	0.061	0.065	0.091	0.101	0.122	0.122	0.151	0.163	0.175
DCP16	.900	-0.117	-0.120	-0.125	-0.124	-0.114	-0.111	-0.124	-0.102	-0.106	-0.105	-0.094
DCP17	.969	-0.036	-0.049	-0.064	-0.050	-0.049	-0.062	-0.068	-0.060	-0.084	-0.077	-0.083

REPRODUCIBILITY OF THE ORIGINAL PAGE

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 9.4 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C	ALPHA	4.591	4.687	5.495	6.158	7.053	7.258	8.016	8.554	9.288	9.524	10.226
		CN	0.616	0.670	0.736	0.808	0.884	0.930	0.968	0.946	0.996	0.983	0.979
		CM	-0.004	-0.001	0.001	0.006	0.014	0.018	0.024	0.027	0.023	0.014	-0.001
DCP 1	.010		1.825	1.951	2.440	2.742	3.064	3.137	3.508	3.297	3.372	3.553	3.481
DCP 2	.020		1.724	1.985	2.224	2.552	2.918	3.132	3.297	3.403	3.490	3.556	3.631
DCP 3	.030		1.725	1.952	2.111	2.312	2.757	2.984	3.140	3.246	3.353	3.434	3.509
DCP 4	.049		1.566	2.203	2.375	2.465	2.532	2.537	2.547	2.548	2.559	2.563	2.573
DCP 5	.074		1.587	2.278	2.468	2.593	2.731	2.928	3.070	3.180	3.292	3.353	3.416
DCP 6	.099		2.022	2.353	2.579	2.705	2.844	2.999	3.123	3.219	3.252	3.076	2.801
DCP 7	.149		1.159	1.113	1.501	2.028	2.631	2.741	2.781	2.385	2.235	1.915	1.650
DCP 8	.200		0.931	1.002	1.005	1.277	1.562	1.788	1.960	1.906	1.608	1.589	1.428
DCP 9	.250		0.811	0.691	0.922	0.941	1.027	1.201	1.365	1.367	1.677	1.579	1.497
DCP10	.300		0.736	0.781	0.837	0.856	0.853	0.902	0.983	0.993	1.408	1.295	1.267
DCP11	.399		0.598	0.649	0.697	0.738	0.759	0.766	0.808	0.830	0.960	1.058	1.070
DCP12	.501		0.438	0.490	0.519	0.549	0.564	0.576	0.568	0.595	0.641	0.615	0.729
DCP13	.600		0.380	0.400	0.430	0.446	0.456	0.445	0.441	0.399	0.434	0.444	0.478
DCP14	.701		0.362	0.397	0.408	0.407	0.410	0.391	0.341	0.303	0.299	0.306	0.370
DCP15	.800		0.177	0.183	0.191	0.196	0.188	0.195	0.167	0.148	0.130	0.165	0.228
DCP16	.900		-0.096	-0.102	-0.093	-0.082	-0.086	-0.075	-0.074	-0.084	-0.097	-0.055	0.004
DCP17	.969		-0.075	-0.085	-0.075	-0.078	-0.078	-0.093	-0.058	-0.090	-0.066	-0.018	-0.004

DATA TYPE	X/C	ALPHA	10.797	11.772	12.074	12.754	13.204	13.931	14.665	15.240	15.761	16.402	17.127
		CN	0.997	1.001	0.959	0.965	0.968	0.986	0.994	0.997	0.939	0.985	1.000
		CM	-0.011	-0.019	-0.025	-0.027	-0.034	-0.045	-0.059	-0.065	-0.063	-0.086	-0.091
DCP 1	.010		3.574	3.572	3.551	3.387	3.254	2.996	3.051	2.701	3.133	1.874	1.845
DCP 2	.020		3.700	3.774	3.755	3.495	3.484	3.181	3.215	2.877	3.022	1.951	1.783
DCP 3	.030		3.603	3.696	3.738	3.585	3.597	3.349	3.546	3.024	2.759	2.052	2.004
DCP 4	.049		2.593	2.564	2.525	2.292	2.301	2.174	2.432	2.229	2.521	2.498	2.536
DCP 5	.074		3.403	3.029	2.780	2.314	2.236	2.131	2.352	2.161	2.193	2.413	2.531
DCP 6	.099		2.609	2.495	2.292	2.172	2.112	2.054	2.214	2.102	1.680	2.238	2.327
DCP 7	.149		1.654	1.687	1.465	1.748	1.696	1.712	1.556	1.741	1.479	1.814	1.893
DCP 8	.200		1.485	1.471	1.316	1.535	1.440	1.481	1.262	1.361	1.271	1.156	1.170
DCP 9	.250		1.430	1.491	1.374	1.461	1.430	1.552	1.310	1.375	1.218	1.191	1.130
DCP10	.300		1.296	1.243	1.175	1.292	1.299	1.375	1.172	1.221	1.173	1.139	1.097
DCP11	.399		0.991	1.092	1.056	1.061	1.047	1.121	1.034	1.125	0.984	1.041	1.022
DCP12	.501		0.800	0.782	0.771	0.747	0.815	0.891	0.872	0.865	0.839	0.904	0.903
DCP13	.600		0.570	0.562	0.585	0.601	0.584	0.654	0.819	0.793	0.737	0.816	0.806
DCP14	.701		0.415	0.439	0.455	0.467	0.542	0.502	0.583	0.621	0.555	0.718	0.770
DCP15	.800		0.261	0.269	0.298	0.278	0.333	0.344	0.435	0.474	0.468	0.545	0.655
DCP16	.900		0.012	0.081	0.063	0.062	0.069	0.086	0.155	0.118	0.157	0.232	0.214
DCP17	.969		-0.006	-0.002	0.025	-0.001	-0.057	-0.008	0.028	-0.003	0.009	0.042	0.028

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 9.4 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C				
ALPHA		17.621	18.054	19.457	20.193
CN		1.006	1.002	1.032	1.056
CM		-0.091	-0.084	-0.085	-0.093
DCP 1	.010	1.845	1.875	1.857	2.168
DCP 2	.020	1.792	1.803	1.824	2.165
DCP 3	.030	2.001	1.945	1.875	2.407
DCP 4	.049	2.542	2.569	2.560	2.324
DCP 5	.074	2.502	2.547	2.576	2.281
DCP 6	.099	2.350	2.340	2.377	2.138
DCP 7	.149	1.954	2.112	2.162	1.987
DCP 8	.200	1.198	1.186	1.287	1.395
DCP 9	.250	1.139	1.147	1.205	1.380
DCP10	.300	1.070	1.082	1.135	1.277
DCP11	.399	1.004	1.027	1.058	1.123
DCP12	.501	0.925	0.869	0.922	0.991
DCP13	.600	0.846	0.806	0.820	0.870
DCP14	.701	0.752	0.739	0.755	0.773
DCP15	.800	0.627	0.612	0.624	0.593
DCP16	.900	0.235	0.222	0.232	0.205
DCP17	.969	0.036	-0.001	0.019	0.027

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.593 Rn = 9.4 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C										
ALPHA		1.234	1.756	2.363	3.035	3.761	4.445	4.781	5.413	5.967	6.685	7.426
CN		0.244	0.316	0.389	0.466	0.544	0.618	0.681	0.750	0.807	0.882	0.935
CM		-0.014	-0.014	-0.012	-0.012	-0.010	-0.005	-0.003	-0.001	0.005	0.011	0.018
DCP 1	.010	-0.081	0.324	0.734	1.096	1.492	1.688	2.252	2.594	3.030	3.293	3.457
DCP 2	.020	0.039	0.395	0.729	1.067	1.393	1.705	1.994	2.252	2.493	2.943	3.186
DCP 3	.030	0.264	0.541	0.853	1.164	1.466	1.740	1.980	2.169	2.350	2.772	3.014
DCP 4	.049	0.549	0.814	1.085	1.374	1.699	1.688	2.232	2.400	2.488	2.760	2.971
DCP 5	.074	0.695	0.917	1.157	1.4 5	1.705	1.978	2.285	2.474	2.604	2.767	2.970
DCP 6	.099	0.698	0.880	1.085	1.314	1.552	1.587	2.341	2.563	2.710	2.837	2.996
DCP 7	.149	0.518	0.639	0.746	0.895	1.043	1.133	1.081	1.543	1.946	2.647	2.781
DCP 8	.200	0.384	0.497	0.620	0.730	0.835	0.934	0.991	1.004	1.166	1.205	1.424
DCP 9	.250	0.350	0.454	0.552	0.639	0.728	0.822	0.889	0.939	0.951	0.990	1.192
DCP10	.300	0.335	0.418	0.496	0.573	0.657	0.724	0.802	0.840	0.863	0.840	0.886
DCP11	.399	0.288	0.339	0.408	0.478	0.534	0.594	0.655	0.708	0.745	0.768	0.786
DCP12	.501	0.226	0.273	0.328	0.352	0.415	0.466	0.508	0.530	0.548	0.586	0.595
DCP13	.600	0.208	0.237	0.272	0.330	0.355	0.398	0.426	0.454	0.476	0.478	0.478
DCP14	.701	0.264	0.308	0.311	0.347	0.373	0.385	0.420	0.435	0.416	0.434	0.416
DCP15	.800	0.116	0.140	0.148	0.174	0.186	0.180	0.190	0.196	0.203	0.207	0.180
DCP16	.900	-0.125	-0.124	-0.105	-0.099	-0.104	-0.109	-0.098	-0.084	-0.080	-0.075	-0.075
DCP17	.969	-0.066	-0.062	-0.071	-0.083	-0.066	-0.081	-0.103	-0.083	-0.103	-0.094	-0.089

DATA TYPE	X/C										
ALPHA		8.105	8.484	9.081	9.710	10.182	11.045	11.676	11.566	12.575	13.263	13.826
CN		0.997	1.006	1.031	1.027	1.036	1.021	1.010	0.928	1.022	1.003	0.976
CM		0.024	0.028	0.024	0.015	-0.002	-0.014	-0.017	-0.012	-0.033	-0.043	-0.033
DCP 1	.010	3.605	3.715	3.787	3.826	3.873	3.883	3.851	4.060	3.761	3.704	3.925
DCP 2	.020	3.342	3.475	3.571	3.624	3.695	3.739	3.769	3.613	3.833	3.741	3.742
DCP 3	.030	3.192	3.329	3.407	3.466	3.538	3.615	3.668	3.206	3.664	3.567	3.334
DCP 4	.049	3.142	3.267	3.358	3.417	3.467	3.504	3.455	2.543	3.206	2.966	2.724
DCP 5	.074	3.133	3.240	3.313	3.367	3.307	3.240	2.889	2.106	2.629	2.540	2.336
DCP 6	.099	3.148	3.236	3.249	3.085	2.835	2.601	2.505	1.556	2.389	2.337	1.918
DCP 7	.149	2.885	2.531	2.252	1.586	1.763	1.578	1.532	1.795	1.580	1.535	1.613
DCP 8	.200	1.712	1.788	1.613	1.561	1.472	1.390	1.353	1.592	1.386	1.271	1.504
DCP 9	.250	1.365	1.489	1.685	1.578	1.525	1.388	1.358	1.406	1.368	1.242	1.405
DCP10	.300	1.092	1.264	1.384	1.349	1.381	1.245	1.284	1.292	1.226	1.221	1.280
DCP11	.399	0.805	0.808	0.997	1.096	1.087	1.092	1.106	0.969	1.072	1.035	1.080
DCP12	.501	0.595	0.594	0.634	0.715	0.738	0.801	0.815	0.735	0.843	0.835	0.803
DCP13	.600	0.473	0.447	0.456	0.395	0.595	0.600	0.592	0.543	0.690	0.722	0.603
DCP14	.701	0.392	0.350	0.315	0.334	0.393	0.439	0.489	0.400	0.607	0.534	0.476
DCP15	.800	0.197	0.168	0.168	0.154	0.226	0.254	0.255	0.250	0.291	0.377	0.324
DCP16	.900	-0.095	-0.095	-0.100	-0.095	0.003	0.061	0.043	-0.034	0.090	0.157	-0.125
DCP17	.969	-0.098	-0.077	-0.058	-0.032	-0.045	-0.003	-0.028	-0.053	-0.029	0.025	-0.045

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.593 Rn = 9.4 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

DATA TYPE	X/C									
ALPHA		14.720	15.284	15.375	16.175	16.792	17.467	18.180	18.896	19.153	19.627
CN		1.017	0.991	1.027	1.030	0.977	1.011	1.027	1.105	1.055	1.010
CM		-0.075	-0.060	-0.060	-0.068	-0.081	-0.092	-0.087	-0.073	-0.085	-0.088
DCP 1	.010	3.632	3.881	3.725	3.750	3.703	3.724	3.747	3.568	3.714	3.177
DCP 2	.020	3.678	3.698	3.416	3.361	3.501	3.555	3.532	3.251	3.457	2.822
DCP 3	.030	3.522	2.992	2.944	3.076	3.115	3.100	2.968	2.731	2.841	2.889
DCP 4	.049	2.805	2.566	2.385	2.553	2.762	2.827	2.846	2.611	2.535	1.955
DCP 5	.074	2.456	2.196	2.347	2.417	2.580	2.704	2.785	2.472	2.455	1.708
DCP 6	.099	2.056	1.780	2.217	1.791	1.422	1.392	1.492	2.204	1.825	1.671
DCP 7	.149	1.293	1.481	1.815	1.673	1.257	1.340	1.357	1.588	1.592	1.532
DCP 8	.200	1.220	1.436	1.443	1.406	1.194	1.224	1.277	1.609	1.296	1.346
DCP 9	.250	1.166	1.325	1.377	1.391	1.139	1.164	1.215	1.531	1.307	1.398
DCP10	.300	1.130	1.198	1.236	1.237	1.041	1.082	1.149	1.418	1.228	1.374
DCP11	.399	1.086	1.133	1.056	1.081	1.021	1.006	1.062	1.131	1.110	1.214
DCP12	.501	0.8[illegible]	0.861	0.919	0.941	0.877	0.888	0.892	0.957	0.984	0.996
DCP13	.600	0.	0.697	0.681	0.801	0.742	0.803	0.855	0.857	0.817	0.821
DCP14	.701	0.65[illegible]	0.653	0.641	0.648	0.720	0.724	0.766	0.669	0.746	0.705
DCP15	.800	0.545	0.394	0.441	0.502	0.578	0.621	0.572	0.458	0.590	0.506
DCP16	.900	0.286	0.176	0.178	0.155	0.275	0.393	0.284	0.212	0.295	0.191
DCP17	.969	0.085	0.032	0.058	-0.030	0.070	0.096	0.075	0.029	0.068	0.023

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.699 Rn = 10.0 x 10^6

DATA TYPE	X/C										
ALPHA		-1.641	-0.944	-0.242	0.563	0.823	1.363	1.542	2.641	3.205	3.576	4.741
CN		-0.102	-0.028	0.061	0.146	0.224	0.312	0.388	0.481	0.578	0.691	0.755
CM		-0.026	-0.021	-0.020	-0.015	-0.015	-0.012	-0.011	-0.009	-0.006	-0.006	-0.003
DCP 1	.010	-2.395	-2.090	-1.411	-0.870	-0.458	-0.046	0.307	0.605	0.767	1.053	1.390
DCP 2	.020	-2.049	-1.472	-0.989	-0.617	-0.264	0.075	0.376	0.637	0.877	1.113	1.331
DCP 3	.030	-1.724	-0.878	-0.627	-0.312	-0.009	0.270	0.523	0.744	0.940	1.126	1.286
DCP 4	.049	-0.468	-0.440	-0.176	0.123	0.375	0.643	0.890	1.085	1.258	1.423	1.562
DCP 5	.074	-0.312	-0.128	0.121	0.385	0.628	0.861	1.038	1.212	1.405	1.559	1.694
DCP 6	.099	-0.174	0.010	0.247	0.493	0.764	1.041	1.222	1.379	1.539	1.680	1.807
DCP 7	.149	-0.137	0.014	0.185	0.344	0.496	0.832	1.247	1.431	1.565	1.698	1.815
DCP 8	.200	-0.133	-0.010	0.135	0.248	0.380	0.490	0.503	1.335	1.492	1.627	1.737
DCP 9	.250	-0.095	0.011	0.125	0.244	0.354	0.468	0.493	0.560	1.473	1.606	1.715
DCP10	.300	-0.042	0.045	0.146	0.242	0.345	0.425	0.482	0.480	0.658	1.536	1.650
DCP11	.399	-0.027	0.046	0.129	0.197	0.269	0.354	0.418	0.448	0.421	0.476	0.754
DCP12	.501	-0.007	0.044	0.096	0.154	0.221	0.259	0.322	0.360	0.369	0.346	0.344
DCP13	.600	0.064	0.086	0.125	0.176	0.204	0.237	0.288	0.321	0.324	0.342	0.314
DCP14	.701	0.167	0.192	0.231	0.252	0.274	0.298	0.324	0.351	0.374	0.365	0.340
DCP15	.800	0.062	0.067	0.091	0.104	0.100	0.117	0.135	0.143	0.158	0.163	0.146
DCP16	.900	-0.123	-0.149	-0.139	-0.133	-0.139	-0.144	-0.145	-0.128	-0.131	-0.111	-0.108
DCP17	.969	-0.037	-0.048	-0.064	-0.060	-0.073	-0.068	-0.073	-0.081	-0.082	-0.069	-0.086

DATA TYPE	X/C										
ALPHA		5.216	5.588	6.337	6.815	7.297	7.586	8.835	9.636	9.810	10.393	11.048
CN		0.814	0.859	0.851	0.900	0.871	0.934	0.986	0.947	1.002	1.035	0.922
CM		-0.001	0.001	-0.005	-0.015	-0.020	-0.016	-0.024	-0.028	-0.040	-0.047	-0.050
DCP 1	.010	1.576	1.804	1.918	2.089	2.206	2.337	2.441	2.557	2.626	2.696	2.765
DCP 2	.020	1.467	1.589	1.691	1.829	1.971	2.121	2.260	2.345	2.457	2.571	2.627
DCP 3	.030	1.419	1.526	1.627	1.718	1.869	2.016	2.169	2.252	2.354	2.457	2.510
DCP 4	.049	1.687	1.767	1.826	1.909	1.971	2.071	2.186	2.256	2.347	2.439	2.494
DCP 5	.074	1.801	1.862	1.927	2.010	2.064	2.137	2.232	2.296	2.371	2.456	2.495
DCP 6	.099	1.923	1.966	2.044	2.107	2.158	2.228	2.293	2.340	2.415	2.477	2.484
DCP 7	.149	1.906	1.980	2.034	2.098	2.130	2.184	2.252	2.264	2.335	2.323	2.006
DCP 8	.200	1.836	1.904	1.927	2.016	1.730	2.095	2.168	1.675	1.941	1.977	1.035
DCP 9	.250	1.825	1.877	1.768	1.932	1.441	1.734	1.886	1.210	1.486	1.545	0.984
DCP10	.300	1.744	1.802	1.316	1.288	1.112	1.312	1.345	1.214	1.184	1.188	0.949
DCP11	.399	0.918	0.990	0.995	0.971	0.909	0.980	0.960	1.036	0.936	0.948	0.874
DCP12	.501	0.459	0.698	0.709	0.734	0.753	0.723	0.732	0.796	0.777	0.766	0.753
DCP13	.600	0.280	0.368	0.432	0.475	0.568	0.559	0.617	0.609	0.659	0.667	0.684
DCP14	.701	0.292	0.230	0.303	0.367	0.362	0.381	0.476	0.523	0.536	0.678	0.573
DCP15	.800	0.130	0.081	0.102	0.183	0.198	0.215	0.274	0.252	0.372	0.430	0.427
DCP16	.900	-0.120	-0.159	-0.121	-0.057	-0.025	-0.095	-0.035	-0.018	0.081	0.085	0.170
DCP17	.969	-0.075	-0.117	-0.092	-0.085	-0.030	-0.026	-0.076	-0.053	0.020	-0.023	0.034

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.699 Rn = 10.0 x 10^6

DATA TYPE	X/C										
ALPHA		11.565	12.218	13.023	13.591	13.504	14.572	15.189	15.712	16.534	16.575	17.736
CN		0.956	0.940	0.971	0.999	0.582	1.031	1.047	1.085	1.122	1.150	1.185
CM		-0.054	-0.050	-0.055	-0.056	-0.049	-0.063	-0.065	-0.072	-0.082	-0.085	-0.110
DCP 1	.010	2.866	2.873	2.995	3.058	3.083	3.145	3.183	3.210	3.247	3.294	3.276
DCP 2	.020	2.726	2.776	2.869	2.920	2.960	3.052	3.112	3.158	3.217	3.217	3.190
DCP 3	.030	2.594	2.648	2.746	2.808	2.859	2.926	2.976	3.024	3.032	2.996	3.049
DCP 4	.049	2.568	2.607	2.692	2.764	2.797	2.839	2.851	2.866	2.852	2.667	2.894
DCP 5	.074	2.570	2.613	2.691	2.723	2.710	2.725	2.722	2.763	2.733	2.594	2.047
DCP 6	.099	2.536	2.536	2.572	2.601	2.591	2.576	2.494	2.543	2.513	2.465	2.219
DCP 7	.149	2.054	2.025	2.057	2.158	2.176	2.256	2.314	2.369	2.452	2.422	2.095
DCP 8	.200	1.081	1.060	1.027	1.121	1.094	1.099	1.135	1.206	1.282	1.481	1.868
DCP 9	.250	1.045	1.002	1.010	1.054	1.014	1.108	1.100	1.160	1.223	1.367	1.634
DCP10	.300	1.011	0.956	0.996	1.011	1.000	1.025	1.060	1.087	1.119	1.276	1.455
DCP11	.399	0.881	0.913	0.947	0.963	0.926	0.928	0.997	1.002	1.070	1.153	1.153
DCP12	.501	0.759	0.744	0.765	0.795	0.770	0.861	0.877	0.887	0.938	0.941	1.048
DCP13	.600	0.725	0.577	0.693	0.661	0.630	0.695	0.754	0.813	0.863	0.860	0.928
DCP14	.701	0.600	0.590	0.582	0.621	0.654	0.741	0.698	0.770	0.736	0.784	0.856
DCP15	.800	0.454	0.497	0.529	0.535	0.546	0.554	0.534	0.582	0.642	0.640	0.733
DCP16	.900	0.196	0.216	0.271	0.241	0.185	0.270	0.261	0.296	0.323	0.324	0.360
DCP17	.969	0.030	-0.035	-0.000	-0.019	-0.133	-0.058	-0.305	-0.057	0.023	-0.014	0.017

DATA TYPE	X/C			
ALPHA		18.183	18.629	19.249
CN		1.198	1.203	1.217
CM		-0.093	-0.122	-0.134
DCP 1	.010	3.316	3.301	3.089
DCP 2	.020	3.009	2.916	2.971
DCP 3	.030	2.675	2.857	2.932
DCP 4	.049	2.035	2.015	2.011
DCP 5	.074	2.064	1.868	1.943
DCP 6	.099	2.157	1.963	1.888
DCP 7	.149	2.312	2.158	1.959
DCP 8	.200	1.951	1.865	1.841
DCP 9	.250	1.757	1.661	1.752
DCP10	.300	1.573	1.525	1.522
DCP11	.399	1.406	1.306	1.357
DCP12	.501	1.171	1.075	1.146
DCP13	.600	0.922	0.928	1.020
DCP14	.701	0.763	0.540	0.928
DCP15	.800	0.612	0.762	0.604
DCP16	.900	0.209	0.366	0.394
DCP17	.969	-0.122	0.027	0.023

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.702 Rn = 10.0 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		-0.208	0.696	1.930	3.028	3.995	5.032	5.895	6.751	7.912	8.831	9.854
CN		0.139	0.272	0.434	0.575	0.720	0.817	0.840	0.934	0.917	0.941	0.944
CM		-0.018	-0.015	-0.009	-0.006	-0.004	-0.001	-0.009	-0.026	-0.009	-0.017	-0.025
DCP 1	.010	-1.039	-0.225	0.326	0.727	1.226	1.494	1.748	2.125	2.147	2.437	2.573
DCP 2	.020	-0.644	-0.079	0.452	0.848	1.164	1.446	1.633	1.875	2.035	2.272	2.421
DCP 3	.030	-0.341	0.139	0.605	0.945	1.201	1.426	1.570	1.766	1.948	2.173	2.311
DCP 4	.049	0.092	0.521	0.963	1.242	1.473	1.664	1.782	1.919	2.011	2.191	2.317
DCP 5	.074	0.477	0.872	1.191	1.486	1.663	1.845	1.948	2.066	2.134	2.281	2.370
DCP 6	.099	0.474	0.931	1.288	1.534	1.720	1.901	1.996	2.117	2.163	2.289	2.342
DCP 7	.149	0.328	0.520	1.306	1.542	1.721	1.882	1.975	2.102	2.132	2.241	2.248
DCP 8	.200	0.243	0.444	1.061	1.465	1.662	1.825	1.907	2.026	2.068	2.172	1.629
DCP 9	.250	0.235	0.415	0.474	1.450	1.632	1.783	1.792	1.927	1.894	2.004	1.273
DCP10	.300	0.216	0.385	0.479	0.664	1.562	1.715	1.300	1.318	1.295	1.355	1.172
DCP11	.399	0.190	0.325	0.434	0.410	0.713	0.967	0.929	0.967	1.000	1.030	1.060
DCP12	.501	0.156	0.247	0.330	0.364	0.321	0.635	0.691	0.778	0.742	0.843	0.816
DCP13	.600	0.170	0.229	0.292	0.336	0.307	0.288	0.440	0.576	0.555	0.587	0.622
DCP14	.701	0.258	0.305	0.340	0.370	0.347	0.246	0.281	0.414	0.347	0.417	0.442
DCP15	.800	0.094	0.116	0.142	0.145	0.162	0.114	0.133	0.205	0.122	0.175	0.270
DCP16	.900	-0.137	-0.141	-0.139	-0.121	-0.115	-0.139	-0.064	-0.014	-0.099	-0.061	-0.023
DCP17	.969	-0.057	-0.075	-0.083	-0.074	-0.084	-0.103	-0.102	-0.067	-0.084	-0.080	-0.080

ALPHA		9.708	9.885	10.621	10.948	10.928	10.866	10.967	11.688	11.854	12.073	12.029
CN		0.985	0.902	0.909	0.917	0.932	0.943	0.924	0.936	0.937	0.953	0.945
CM		-0.027	-0.031	-0.046	-0.047	-0.053	-0.049	-0.043	-0.051	-0.046	-0.047	-0.052
DCP 1	.010	2.591	2.597	2.672	2.601	2.595	2.681	2.778	2.729	2.807	2.841	2.825
DCP 2	.020	2.470	2.445	2.504	2.566	2.567	2.593	2.614	2.707	2.706	2.714	2.714
DCP 3	.030	2.359	2.331	2.399	2.459	2.455	2.478	2.502	2.586	2.563	2.601	2.602
DCP 4	.049	2.355	2.330	2.382	2.441	2.440	2.457	2.480	2.561	2.547	2.559	2.571
DCP 5	.074	2.424	2.404	2.451	2.501	2.489	2.519	2.529	2.614	2.603	2.618	2.618
DCP 6	.099	2.413	2.393	2.437	2.467	2.458	2.493	2.482	2.493	2.512	2.511	2.497
DCP 7	.149	2.344	2.148	2.027	2.026	2.042	2.074	2.052	2.045	2.096	2.101	2.044
DCP 8	.200	1.836	1.197	1.035	1.060	1.094	1.143	1.069	1.057	1.049	1.107	1.153
DCP 9	.250	1.308	1.131	1.012	1.037	1.036	1.055	1.024	0.984	1.035	1.057	1.020
DCP10	.300	1.225	1.009	0.965	0.964	0.967	1.051	0.976	0.911	0.962	1.008	0.962
DCP11	.399	1.119	0.965	0.903	0.896	0.870	0.923	0.872	0.898	0.910	0.907	0.879
DCP12	.501	0.818	0.763	0.811	0.731	0.760	0.758	0.821	0.760	0.777	0.806	0.766
DCP13	.600	0.641	0.586	0.622	0.695	0.660	0.670	0.674	0.655	0.653	0.678	0.646
DCP14	.701	0.491	0.498	0.550	0.556	0.678	0.604	0.557	0.602	0.550	0.613	0.643
DCP15	.800	0.246	0.280	0.365	0.420	0.415	0.395	0.400	0.475	0.451	0.400	0.435
DCP16	.900	0.020	0.040	0.173	0.136	0.165	0.181	0.117	0.169	0.159	0.171	0.219
DCP17	.969	-0.066	0.005	0.000	-0.001	-0.011	-0.009	-0.036	0.026	-0.024	-0.041	-0.003

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.702 Rn = 10.0 x 10^6

ALPHA		12.353	12.803	12.960	12.849	13.297	13.831	13.940	13.761	13.964	14.560	15.022
CN		0.960	0.978	0.976	0.976	0.997	1.015	1.011	1.010	1.015	1.045	1.057
CM		-0.052	-0.056	-0.057	-0.052	-0.058	-0.063	-0.057	-0.057	-0.060	-0.065	-0.067
DCP 1	.010	2.928	2.818	2.805	2.861	2.988	2.862	2.998	2.956	3.011	3.112	3.138
DCP 2	.020	2.800	2.858	2.830	2.847	2.879	2.960	2.955	2.932	2.963	3.059	3.071
DCP 3	.030	2.681	2.733	2.698	2.718	2.759	2.843	2.833	2.811	2.844	2.934	2.951
DCP 4	.049	2.649	2.696	2.670	2.672	2.710	2.765	2.763	2.735	2.771	2.755	2.787
DCP 5	.074	2.677	2.698	2.705	2.691	2.704	2.725	2.748	2.699	2.729	2.685	2.749
DCP 6	.099	2.535	2.565	2.540	2.520	2.556	2.548	2.568	2.542	2.565	2.451	2.491
DCP 7	.149	2.081	2.109	2.111	2.154	2.131	2.199	2.209	2.223	2.238	2.297	2.335
DCP 8	.200	1.052	1.043	1.136	1.125	1.098	1.113	1.141	1.211	1.166	1.212	1.201
DCP 9	.250	1.028	0.995	1.027	1.107	1.051	1.055	1.073	1.096	1.078	1.126	1.133
DCP10	.300	0.973	0.996	0.958	0.970	1.068	1.076	1.011	0.996	0.977	1.068	1.021
DCP11	.399	0.890	0.915	0.892	0.918	0.941	0.935	0.915	0.943	0.936	1.008	1.006
DCP12	.501	0.818	0.781	0.774	0.797	0.823	0.805	0.829	0.829	0.786	0.871	0.911
DCP13	.600	0.669	0.765	0.677	0.629	0.668	0.667	0.751	0.733	0.742	0.771	0.763
DCP14	.701	0.541	0.632	0.668	0.667	0.690	0.691	0.715	0.642	0.700	0.663	0.686
DCP15	.800	0.481	0.483	0.536	0.488	0.491	0.584	0.513	0.547	0.532	0.534	0.631
DCP16	.900	0.231	0.216	0.245	0.211	0.227	0.253	0.195	0.232	0.241	0.246	0.234
DCP17	.969	0.030	-0.026	-0.073	-0.050	-0.012	0.007	-0.064	-0.091	-0.018	0.035	-0.054

ALPHA		15.071	14.716	15.123	15.771	15.694	15.871	16.370	16.575	16.706	16.620	16.763
CN		1.054	1.055	1.079	1.087	1.109	1.102	1.122	1.117	1.129	1.090	1.119
CM		-0.067	-0.069	-0.069	-0.072	-0.083	-0.077	-0.080	-0.092	-0.089	-0.094	-0.098
DCP 1	.010	2.964	3.076	3.160	3.244	3.173	3.174	3.240	3.261	3.265	3.245	3.258
DCP 2	.020	3.039	3.056	3.120	3.183	3.142	3.128	3.180	3.222	3.224	3.138	2.931
DCP 3	.030	2.926	2.937	2.992	3.043	3.011	3.012	3.045	3.014	3.049	2.928	1.998
DCP 4	.049	2.781	2.747	2.810	2.831	2.814	2.801	2.841	2.384	2.832	2.011	2.344
DCP 5	.074	2.733	2.685	2.744	2.711	2.696	2.751	2.723	2.295	2.721	1.952	2.315
DCP 6	.099	2.520	2.462	2.517	2.508	2.501	2.526	2.529	2.177	2.548	1.827	2.251
DCP 7	.149	2.338	2.339	2.396	2.435	2.418	2.422	2.451	2.060	2.106	1.722	2.075
DCP 8	.200	1.263	1.163	1.240	1.171	1.250	1.249	1.300	1.406	1.365	1.464	1.769
DCP 9	.250	1.153	1.144	1.139	1.190	1.224	1.192	1.223	1.453	1.251	1.548	1.345
DCP10	.300	1.084	1.081	1.087	1.103	1.114	1.136	1.131	1.319	1.174	1.453	1.257
DCP11	.399	0.968	0.995	1.068	0.999	1.078	1.093	1.120	1.152	1.101	1.241	1.138
DCP12	.501	0.902	0.847	0.893	0.916	0.898	0.892	0.913	1.035	0.959	1.052	1.021
DCP13	.600	0.719	0.754	0.801	0.842	0.757	0.770	0.835	0.849	0.840	0.962	0.900
DCP14	.701	0.619	0.790	0.710	0.769	0.619	0.717	0.775	0.797	0.807	0.777	0.824
DCP15	.800	0.626	0.572	0.585	0.577	0.639	0.640	0.619	0.635	0.684	0.591	0.683
DCP16	.900	0.290	0.258	0.256	0.250	0.330	0.346	0.329	0.279	0.334	0.213	0.307
DCP17	.969	-0.023	-0.052	-0.036	-0.059	0.043	-0.016	-0.028	-0.002	0.010	-0.121	-0.088

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.702 Rn = 10.0 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		17.428	17.930	17.723	17.631	18.113	18.566	18.714	18.925	18.834	19.393	19.427
CN		1.126	1.1[illegible]	1.156	1.136	1.124	1.103	1.180	1.164	1.158	1.190	1.219
CM		-0.114	-0.111	-0.112	-0.114	-0.119	-0.132	-0.137	-0.131	-0.128	-0.138	-0.148
DCP 1	.010	3.126	3.325	3.294	3.274	3.345	3.284	3.316	3.321	3.284	3.063	3.069
DCP 2	.020	3.099	3.017	2.973	2.998	3.115	2.948	3.156	3.144	3.056	2.859	2.998
DCP 3	.030	3.035	2.692	1.981	2.025	2.791	2.840	2.767	2.843	2.666	2.829	2.697
DCP 4	.049	1.892	1.843	2.385	2.179	1.825	1.804	1.803	1.819	1.847	1.836	1.863
DCP 5	.074	1.830	1.781	2.320	2.136	1.735	1.741	1.726	1.755	1.754	1.742	1.776
DCP 6	.099	1.730	1.711	2.249	2.052	1.617	1.634	1.651	1.677	1.673	1.676	1.708
DCP 7	.149	1.662	1.585	2.028	1.966	1.492	1.563	1.544	1.522	1.557	1.557	1.593
DCP 8	.200	1.597	1.498	1.826	1.805	1.357	1.375	1.411	1.427	1.461	1.495	1.516
DCP 9	.250	1.665	1.723	1.364	1.387	1.577	1.652	1.597	1.526	1.693	1.792	1.782
DCP10	.300	1.452	1.666	1.284	1.305	1.674	1.698	1.755	1.735	1.665	1.721	1.747
DCP11	.399	1.257	1.456	1.197	1.216	1.444	1.438	1.530	1.480	1.468	1.485	1.476
DCP12	.501	1.078	1.036	1.061	1.054	1.120	1.216	1.207	1.138	1.186	1.229	1.258
DCP13	.600	0.978	0.869	0.934	0.929	0.951	1.021	1.024	1.001	0.903	1.006	1.091
DCP14	.701	0.869	0.816	0.854	0.844	0.850	0.895	0.873	0.864	0.855	0.896	0.914
DCP15	.800	0.679	0.669	0.740	0.716	0.674	0.712	0.727	0.721	0.754	0.748	0.793
DCP16	.900	0.295	0.270	0.368	0.374	0.283	0.323	0.350	0.345	0.336	0.343	0.366
DCP17	.969	-0.052	-0.027	0.016	0.001	-0.025	0.013	0.079	0.018	0.006	[illegible].094	0.130

ALPHA		19.533	19.538	19.644	19.73[illegible]	19.592
CN		1.246	1.210	1.206	1.2[illegible]7	1.202
CM		-0.157	-0.144	-0.143	-0.145	-0.143
DCP 1	.010	3.195	3.062	3.055	3.063	2.921
DCP 2	.020	3.077	2.963	2.934	2.867	2.837
DCP 3	.030	2.850	2.862	2.778	2.736	2.610
DCP 4	.049	1.87[illegible]	1.855	1.853	1.850	1.874
DCP 5	.074	1.77[illegible]	1.793	1.792	1.778	1.783
DCP 6	.099	1.706	1.705	1.716	1.700	1.714
DCP 7	.149	1.624	1.607	1.620	1.557	1.602
DCP 8	.200	1.489	1.464	1.491	1.514	1.519
DCP 9	.250	1.675	1.761	1.736	1.792	1.826
DCP10	.300	1.775	1.763	1.711	1.735	1.663
DCP11	.399	1.543	1.518	1.492	1.491	1.478
DCP12	.501	1.303	1.218	1.241	1.204	1.218
DCP13	.600	1.122	1.019	1.059	1.056	1.035
DCP14	.701	0.977	0.875	0.921	0.964	0.899
DCP15	.800	0.801	0.798	0.745	0.750	0.757
DCP16	.900	0.419	0.401	0.364	0.391	0.403
DCP17	.969	0.150	0.103	0.097	0.062	0.104

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.750 Rn = 10.0 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		2.145	1.478	0.674	-0.003	-0.623	-1.306	-1.894	-2.288	-2.749	-3.544	-4.219
CN		0.404	0.314	0.218	0.110	0.016	-0.076	-0.182	-0.304	-0.433	-0.505	-0.608
CM		-0.013	-0.014	-0.015	-0.021	-0.024	-0.029	-0.034	-0.037	-0.043	-0.047	-0.037
DCP 1	.010	-0.064	-0.361	-0.718	-1.196	-1.742	-1.983	-2.195	-2.349	-2.494	-2.629	-2.712
DCP 2	.020	0.043	-0.237	-0.552	-0.927	-1.372	-1.719	-1.946	-2.127	-2.336	-2.446	-2.553
DCP 3	.030	0.247	0.018	-0.256	-0.564	-1.041	-1.453	-1.658	-1.887	-2.054	-2.198	-2.314
DCP 4	.049	0.608	0.397	0.168	-0.074	-0.321	-0.695	-1.285	-1.493	-1.696	-1.829	-1.952
DCP 5	.074	0.779	0.617	0.425	0.196	-0.066	-0.513	-0.859	-1.184	-1.378	-1.523	-1.675
DCP 6	.099	0.965	0.813	0.635	0.418	0.144	0.016	-0.738	-1.005	-1.196	-1.356	-1.497
DCP 7	.149	1.013	0.875	0.694	0.315	0.092	-0.045	-0.581	-0.919	-1.094	-1.248	-1.382
DCP 8	.200	0.577	0.626	0.585	0.187	0.045	-0.058	-0.381	-0.908	-1.086	-1.207	-1.327
DCP 9	.250	0.582	0.832	0.263	0.217	0.176	-0.055	-0.067	-0.534	-1.054	-1.184	-1.302
DCP10	.300	0.945	0.561	0.303	0.225	0.109	-0.035	-0.058	-0.064	-0.525	-1.071	-1.183
DCP11	.399	0.402	0.256	0.275	0.179	0.082	0.006	-0.063	-0.032	-0.095	-0.402	-0.782
DCP12	.501	0.197	0.248	0.213	0.150	0.094	0.018	-0.046	-0.065	-0.026	-0.064	-0.252
DCP13	.600	0.239	0.236	0.221	0.167	0.134	0.086	0.035	-0.004	-0.032	0.052	0.015
DCP14	.701	0.334	0.312	0.311	0.264	0.242	0.228	0.198	0.164	0.167	0.171	0.184
DCP15	.800	0.109	0.103	0.107	0.072	0.090	0.078	0.054	0.027	0.035	0.038	0.067
DCP16	.900	-0.152	-0.162	-0.163	-0.152	-0.161	-0.153	-0.143	-0.148	-0.152	-0.136	-0.099
DCP17	.969	-0.080	-0.061	-0.068	-0.067	-0.067	-0.044	-0.038	-0.053	-0.057	-0.039	-0.031

ALPHA		-1.783	-1.174	-0.748	-0.149	0.377	1.073	1.619	6.485	7.171	7.868	8.634
CN		-0.123	-0.033	0.062	0.155	0.256	0.368	0.464	0.758	0.786	0.805	0.796
CM		-0.032	-0.028	-0.022	-0.019	-0.019	-0.015	-0.013	-0.026	-0.030	-0.036	-0.038
DCP 1	.010	-2.085	-1.864	-1.500	-0.927	-0.520	-0.179	0.104	1.513	1.626	1.796	1.900
DCP 2	.020	-1.843	-1.575	-1.079	-0.721	-0.369	-0.075	0.183	1.353	1.418	1.579	1.671
DCP 3	.030	-1.576	-1.290	-0.753	-0.411	-0.115	0.136	0.347	1.316	1.378	1.501	1.602
DCP 4	.049	-1.156	-0.581	-0.216	0.041	0.286	0.511	0.706	1.524	1.565	1.664	1.719
DCP 5	.074	-0.731	-0.311	0.022	0.273	0.490	0.689	0.855	1.649	1.685	1.781	1.819
DCP 6	.099	-0.478	0.008	0.271	0.527	0.713	0.884	1.027	1.737	1.762	1.861	1.896
DCP 7	.149	-0.053	-0.007	0.190	0.510	0.805	0.966	1.101	1.721	1.760	1.848	1.880
DCP 8	.200	-0.130	-0.036	0.119	0.230	0.755	0.911	1.078	1.671	1.706	1.687	1.615
DCP 9	.250	-0.095	0.006	0.145	0.263	0.307	0.918	1.056	1.496	1.533	1.247	1.137
DCP10	.300	-0.046	0.040	0.161	0.268	0.294	0.857	1.010	1.108	1.107	1.000	0.947
DCP11	.399	-0.025	0.054	0.154	0.229	0.308	0.704	0.717	0.757	0.776	0.833	0.745
DCP12	.501	-0.006	0.051	0.108	0.180	0.236	0.232	0.200	0.607	0.644	0.710	0.594
DCP13	.600	0.061	0.102	0.142	0.182	0.245	0.260	0.215	0.473	0.548	0.579	0.576
DCP14	.701	0.224	0.237	0.254	0.293	0.307	0.327	0.325	0.389	0.426	0.466	0.535
DCP15	.800	0.067	0.084	0.067	0.084	0.112	0.095	0.115	0.288	0.288	0.291	0.363
DCP16	.900	-0.142	-0.143	-0.147	-0.161	-0.143	-0.133	-0.134	-0.051	-0.066	0.003	0.059
DCP17	.969	-0.043	-0.035	-0.048	-0.077	-0.068	-0.075	-0.072	-0.110	-0.092	-0.105	-0.149

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.750 Rn = 10.0 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		9.054	9.431	10.087	10.703	11.247	11.861	12.512	13.217	13.904	14.267
CN		0.913	0.868	0.902	0.892	0.875	0.921	0.954	0.995	1.054	1.075
CM		-0.045	-0.048	-0.051	-0.051	-0.054	-0.067	-0.072	-0.078	-0.092	-0.095
DCP 1	.010	2.054	2.178	2.293	2.347	2.462	2.507	2.589	2.643	2.703	2.765
DCP 2	.020	1.819	1.941	2.082	2.158	2.269	2.327	2.433	2.495	2.556	2.626
DCP 3	.030	1.750	1.872	1.996	2.068	2.179	2.223	2.321	2.382	2.456	2.518
DCP 4	.049	1.815	1.[illegible]	2.018	2.073	2.171	2.208	2.29[illegible]	2.349	2.420	2.477
DCP 5	.074	1.890	1.9[illegible]	2.057	2.110	2.196	2.23[illegible]	2.325	2.371	2.424	2.484
DCP 6	.099	1.952	2.0[illegible]	2.096	2.142	2.213	2.24[illegible]	2.329	2.373	2.426	2.483
DCP 7	.149	1.926	1.9[illegible]	2.048	2.080	2.044	2.052	2.117	2.122	2.175	2.212
DCP 8	.200	1.878	1.516	1.457	1.486	1.096	1.118	1.120	1.200	1.223	1.256
DCP 9	.250	1.816	1.213	1.119	1.090	0.[illegible]74	0.987	1.094	1.0[illegible]9	1.189	1.196
DCP10	.300	1.278	1.052	0.991	0.974	0.873	0.989	0.974	1.052	1.092	1.[illegible]30
DCP11	.399	0.858	0.854	0.899	0.821	0.815	0.832	0.864	0.953	1.043	1.[illegible]15
DCP12	.501	0.684	0.677	0.747	0.782	0.756	0.778	0.749	0.845	0.905	0.926
DCP13	.600	0.593	0.581	0.609	0.623	0.603	0.686	0.709	0.721	0.794	0.825
DCP14	.701	0.561	0.572	0.607	0.600	0.589	0.632	0.667	0.700	0.759	0.735
DCP15	.800	0.447	0.454	0.488	0.469	0.506	0.544	0.607	0.617	0.655	0.688
DCP16	.900	0.055	0.152	0.152	0.177	0.221	0.288	0.307	0.3[illegible]0	0.354	0.402
DCP1[illegible]	.949	-0.180	-0.187	-0.203	-0.179	-0.149	-0.068	-0.046	-0.044	0.045	0.048

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.797 Rn = 10.5 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		-1.687	-1.062	-0.507	-0.045	0.614	1.098	1.721	2.341	3.143	3.836	4.234
CN		-0.131	-0.012	0.105	0.221	0.332	0.416	0.455	0.479	0.478	0.505	0.495
CM		-0.035	-0.031	-0.029	-0.028	-0.035	-0.040	-0.039	-0.031	-0.018	-0.015	0.001
DCP 1	.010	-1.831	-1.668	-1.423	-0.981	-0.675	0.428	-0.258	-0.064	0.097	0.278	0.420
DCP 2	.020	-1 592	-1.400	-1.033	-0.813	-0.543	-0.312	-0.163	0.022	0.160	0.313	0.435
DCP 3	.030	-1.366	-1.165	-0.881	-0.512	-0.282	-0.095	0.035	0.186	0.309	0.443	0.539
DCP 4	.049	-0.969	-0.711	-0.183	-0.048	0.123	0.286	0.394	0.524	0.619	0.739	0.830
DCP 5	.074	-0.479	-0.352	-0.136	0.137	0.312	0.459	0.554	0.668	0.756	0.877	0.963
DCP 6	.099	-0.348	-0.113	0.234	0.419	0.562	0.676	0.747	0.843	0.923	1.018	1.097
DCP 7	.149	-0.333	0.080	0.335	0.517	0.654	0.761	0.831	0.922	0.982	1.067	1.127
DCP 8	.200	-0.393	0.016	0.314	0.505	0.618	0.734	0.802	0.896	0.955	1.033	1.089
DCP 9	.250	-0.398	0.029	0.283	0.519	0.638	0.735	0.802	0.887	0.942	1.027	1.078
DCP10	.300	-0.333	0.078	0.189	0.513	0.628	0.730	0.795	0.869	0.917	0.987	1.046
DCP11	.399	0.124	0.074	0.162	0.497	0.637	0.728	0.778	0.850	0.895	0.9 4	0.993
DCP12	.501	0.091	0.092	0.217	0.237	0.624	0.712	0.749	0.807	0.844	0.661	0.377
DCP13	.600	0.131	0.146	0.202	0.152	0.416	0.763	0.802	0.563	0.215	0.201	0.204
DCP14	.701	0.270	0.299	0.326	0.324	0.184	0.148	0.179	0.146	0.145	0.169	0.181
DCP15	.300	0.056	0.061	0.066	0.072	0.045	-0.001	-0.019	-0.001	0.032	0.078	0.104
DCP16	.900	-0.159	-0.151	-0.168	-0.159	-0.169	-0.196	-0.208	-0.185	-0.211	-0.201	-0.196
DCP17	.969	-0.059	-0.047	-0.057	-0.056	-0.071	-0.086	-0.118	-0.113	-0.120	-0.114	-0.364

ALPHA		4.728	5.358	5.907	6.476	7.289	7.851	8.514	8.992	9.601	10.150	10.777
CN		0.530	0.576	0.628	0.679	0.735	0.801	0.865	0.951	1.026	1.099	1.197
CM		0.001	-0.006	-0.018	-0.025	-0.041	-0.053	-0.069	-0.093	-0.110	-0.130	-0.161
DCP 1	.010	0.574	0.728	0.846	1.045	1.074	1.257	1.387	1.530	1.654	1.781	1.880
DCP 2	.020	0.571	0.709	0.810	0.950	1.039	1.159	1.248	1.331	1.454	1.573	1.683
DCP 3	.030	0.651	0.765	0.838	0.963	1.038	1.131	1.219	1.291	1.390	1.509	1.612
DCP 4	.049	0.924	1.027	1.086	1.186	1.242	1.322	1.388	1.448	1.523	1.588	1.668
DCP 5	.074	1.047	1.143	1.208	1.300	1.343	1.438	1.496	1.545	1.610	1.667	1.730
DCP 6	.099	1.168	1.262	1.295	1.405	1.442	1.518	1.581	1.625	1.691	1.736	1.783
DCP 7	.149	1.202	1.275	1.322	1.408	1.440	1.515	1.565	1.611	1.670	1.720	1.761
DCP 8	.200	1.148	1.219	1.271	1.347	1.390	1.459	1.513	1.553	1.610	1.655	1.701
DCP 9	.250	1.138	1.205	1.241	1.322	1.359	1.427	1.471	1.513	1.566	1.611	1.651
DCP10	.300	1.092	1.160	1.194	1.261	1.303	1.358	1.406	1.444	1.492	1.540	1.571
DCP11	.399	1.056	1.013	1.081	1.059	1.154	1.247	1.332	1.387	1.434	1.478	1.518
DCP12	.501	0.348	0.395	0.448	0.497	0.548	0.606	0.698	0.986	1.240	1.368	1.408
DCP13	.600	0.221	0.273	0.324	0.373	0.433	0.506	0.554	0.628	0.694	0.818	1.305
DCP14	.701	0.210	0.239	0.296	0.336	0.390	0.441	0.515	0.582	0.641	0.716	0.792
DCP15	.800	0.135	0.191	0.243	0.268	0.319	0.392	0.440	0.532	0.582	0.651	0.720
DCP16	.900	-0.145	-0.125	-0.063	-0.027	0.053	0.090	0.157	0.243	0.288	0.352	0.425
DCP17	.969	-0.475	-0.433	-0.393	-0.335	-0.272	-0.241	-0.163	-0.083	-0.031	0.040	0.117

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.797 Rn = 10.5 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		11.200	12.076	12.639	13.817	13.783
CN		1.280	1.437	1.524	1.563	1.608
CM		-0.186	-0.258	-0.293	-0.300	-0.308
DCP 1	.010	2.010	2.070	2.127	2.237	2.291
DCP 2	.020	1.801	1.888	1.985	2.062	2.156
DCP 3	.030	1.727	1.812	1.906	1.984	2.072
DCP 4	.049	1.754	1.813	1.893	1.963	2.042
DCP 5	.074	1.803	1.859	1.932	1.990	2.060
DCP 6	.099	1.845	1.896	1.959	2.013	2.078
DCP 7	.149	1.811	1.852	1.909	1.958	2.018
DCP 8	.200	1.760	1.797	1.848	1.894	1.948
DCP 9	.250	1.705	1.746	1.795	1.837	1.890
DCP10	.300	1.624	1.656	1.706	1.745	1.792
DCP11	.399	1.566	1.601	1.648	1.685	1.731
DCP12	.501	1.454	1.490	1.533	1.566	1.615
DCP13	.600	1.398	1.432	1.470	1.503	1.543
DCP14	.701	1.026	1.408	1.444	1.473	1.506
DCP15	.800	0.786	1.405	1.495	1.516	1.553
DCP16	.900	0.510	0.753	1.218	1.251	1.275
DCP17	.969	0.209	0.406	0.456	0.517	0.543

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.800 Rn = 10.5 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		1.626	1.052	0.557	-0.253	-0.983	-1.486	-2.193	-2.558	-4.695	-5.139	-5.930
CN		0.425	0.365	0.260	0.158	0.028	-0.079	-0.231	-0.346	-0.523	-0.550	-0.537
CM		-0.039	-0.038	-0.027	-0.028	-0.030	-0.034	-0.031	-0.026	-0.003	-0.012	-0.030
DCP 1	.010	-0.425	-0.637	-0.900	-1.293	-1.609	-1.775	-1.956	-2.065	-2.239	-2.377	-2.425
DCP 2	.020	-0.252	-0.450	-0.687	-0.938	-1.271	-1.510	-1.680	-1.838	-2.049	-2.185	-2.238
DCP 3	.030	-0.050	-0.216	-0.416	-0.760	-1.019	-1.287	-1.470	-1.624	-1.837	-1.989	-2.049
DCP 4	.049	0.323	0.176	0.024	-0.156	-0.503	-0.868	-1.073	-1.235	-1.471	-1.625	-1.687
DCP 5	.074	0.485	0.354	0.204	-0.049	-0.264	-0.417	-0.573	-0.778	-1.131	-1.311	-1.392
DCP 6	.099	0.697	0.592	0.475	0.308	0.014	-0.251	-0.484	-0.726	-1.013	-1.177	-1.246
DCP 7	.149	0.781	0.687	0.568	0.414	0.212	-0.249	-0.476	-0.685	-0.927	-1.082	-1.148
DCP 8	.200	0.750	0.647	0.547	0.394	0.069	-0.316	-0.546	-0.714	-0.912	-1.050	-1.101
DCP 9	.250	0.756	0.667	0.561	0.414	0.049	-0.256	-0.538	-0.696	-0.882	-1.007	-1.058
DCP10	.300	0.744	0.656	0.545	0.414	0.146	0.103	-0.466	-0.612	-0.792	-0.913	-0.962
DCP11	.399	0.736	0.662	0.565	0.380	0.108	0.072	-0.474	-0.615	-0.778	-0.894	-0.890
DCP12	.501	0.711	0.649	0.553	0.116	0.144	0.067	0.127	-0.350	-0.756	-0.307	-0.272
DCP13	.600	0.765	0.704	0.125	0.208	0.178	0.118	0.140	0.156	-0.111	-0.123	-0.133
DCP14	.701	0.196	0.137	0.227	0.325	0.311	0.283	0.276	0.296	0.123	0.094	0.065
DCP15	.800	-0.024	0.005	0.050	0.065	0.061	0.064	0.067	0.088	0.054	-0.016	0.362
DCP16	.900	-0.215	-0.204	-0.184	-0.168	-0.173	-0.160	-0.171	-0.141	-0.091	-0.104	-0.158
DCP17	.969	-0.093	-0.087	-0.061	-0.067	-0.059	-0.041	-0.057	-0.061	-0.079	-0.059	-0.056

ALPHA		-6.497	-7.072	-7.508	-8.021	-8.819	-9.433	-10.113
CN		-0.535	-0.561	-0.559	-0.602	-0.666	-0.738	-0.807
CM		-0.037	-0.036	-0.057	-0.053	-0.041	-0.025	-0.004
DCP 1	.010	-2.503	-2.573	-2.618	-2.643	-2.837	-2.781	-2.768
DCP 2	.020	-2.303	-2.369	-2.427	-2.486	-2.532	-2.593	-2.615
DCP 3	.030	-2.122	-2.178	-2.243	-2.308	-2.367	-2.437	-2.464
DCP 4	.049	-1.760	-1.836	-1.911	-1.979	-2.046	-2.113	-2.151
DCP 5	.074	-1.471	-1.549	-1.639	-1.707	-1.783	-1.858	-1.901
DCP 6	.099	-1.328	-1.400	-1.475	-1.543	-1.611	-1.686	-1.734
DCP 7	.149	-1.231	-1.304	-1.382	-1.445	-1.506	-1.570	-1.606
DCP 8	.200	-1.164	-1.227	-1.295	-1.365	-1.427	-1.489	-1.524
DCP 9	.250	-1.119	-1.183	-1.247	-1.299	-1.361	-1.415	-1.447
DCP10	.300	-1.015	-1.071	-1.084	-1.132	-1.213	-1.281	-1.327
DCP11	.399	-0.637	-0.557	-0.534	-0.582	-0.701	-0.852	-1.036
DCP12	.501	-0.303	-0.321	-0.381	-0.445	-0.506	-0.590	-0.648
DCP13	.600	-0.136	-0.173	-0.238	-0.286	-0.361	-0.433	-0.487
DCP14	.701	0.054	-0.017	-0.045	-0.106	-0.152	-0.212	-0.278
DCP15	.800	0.420	0.386	0.358	0.270	0.238	0.173	0.098
DCP16	.900	-0.157	-0.093	0.339	0.301	0.265	0.209	0.123
DCP17	.969	-0.087	-0.102	-0.064	0.162	0.100	0.045	-0.042

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.849 Rn = 11.0 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		1.283	0.693	0.192	-0.481	-1.377	-1.887	-2.585	-3.070	-3.546	-4.261	-4.928
CN		0.179	0.107	0.028	-0.036	-0.120	-0.199	-0.206	-0.282	-0.329	-0.389	-0.470
CM		-0.009	0.004	0.016	0.012	0.016	0.016	-0.009	-0.015	-0.021	-0.013	0.009
DCP 1	.010	-0.835	-1.147	-1.326	-1.387	-1.526	-1.645	-1.684	-1.868	-1.911	-1.947	-2.130
DCP 2	.020	-0.682	-0.812	-0.898	-1.091	-1.227	-1.355	-1.438	-1.565	-1.651	-1.728	-1.806
DCP 3	.030	-0.429	-0.634	-0.764	-0.868	-1.010	-1.147	-1.233	-1.359	-1.439	-1.519	-1.600
DCP 4	.049	-0.021	-0.090	-0.253	-0.450	-0.582	-0.735	-0.831	-0.982	-1.071	-1.149	-1.232
DCP 5	.074	0.083	-0.016	-0.095	-0.187	-0.275	-0.319	-0.363	-0.520	-0.654	-0.787	-0.898
DCP 6	.099	0.369	0.282	0.114	0.023	-0.053	-0.155	-0.236	-0.431	-0.570	-0.684	-0.780
DCP 7	.149	0.459	0.381	0.304	0.135	0.038	-0.062	-0.164	-0.415	-0.526	-0.631	-0.725
DCP 8	.200	0.410	0.338	0.273	0.092	-0.002	-0.126	-0.312	-0.464	-0.548	-0.630	-0.706
DCP 9	.250	0.419	0.326	0.239	0.115	-0.029	-0.184	-0.308	-0.453	-0.532	-0.608	-0.682
DCP10	.300	0.434	0.348	0.258	0.202	-0.001	-0.146	-0.251	-0.360	-0.438	-0.515	-0.596
DCP11	.399	0.406	0.343	0.247	0.147	-0.033	-0.259	-0.260	-0.383	-0.471	-0.528	-0.589
DCP12	.501	0.338	0.279	0.196	0.093	-0.028	-0.217	-0.290	-0.401	-0.428	-0.482	-0.550
DCP13	.600	0.324	0.270	0.194	0.069	-0.063	-0.112	-0.203	-0.341	-0.405	-0.451	-0.502
DCP14	.701	0.330	0.281	0.225	0.146	0.060	-0.005	-0.101	-0.200	-0.247	-0.295	-0.337
DCP15	.800	-0.161	-0.274	-0.382	-0.412	-0.423	-0.316	0.197	0.405	0.027	-0.025	-0.072
DCP16	.900	-0.358	-0.467	-0.506	-0.245	-0.090	-0.021	0.016	0.096	0.552	0.400	0.147
DCP17	.969	-0.124	-0.038	-0.012	-0.018	-0.013	-0.006	0.036	0.032	0.166	0.343	0.309

ALPHA		-5.577	-6.159	-6.665	-7.137	-7.733	-8.454	-9.078	-9.631
CN		-0.548	-0.620	-0.680	-0.734	-0.795	-0.854	-0.909	-0.964
CM		0.039	0.058	0.071	0.080	0.092	0.104	0.113	0.124
DCP 1	.010	-2.100	-2.260	-2.208	-2.354	-2.433	-2.346	-2.495	-2.502
DCP 2	.020	-1.856	-1.927	-2.000	-2.069	-2.137	-2.208	-2.261	-2.322
DCP 3	.030	-1.661	-1.736	-1.814	-1.880	-1.949	-2.025	-2.094	-2.163
DCP 4	.049	-1.292	-1.375	-1.457	-1.531	-1.606	-1.686	-1.763	-1.837
DCP 5	.074	-0.985	-1.070	-1.164	-1.240	-1.333	-1.422	-1.506	-1.584
DCP 6	.099	-0.857	-0.943	-1.033	-1.107	-1.194	-1.276	-1.358	-1.438
DCP 7	.149	-0.802	-0.882	-0.960	-1.038	-1.112	-1.189	-1.264	-1.335
DCP 8	.200	-0.764	-0.832	-0.909	-0.978	-1.052	-1.129	-1.201	-1.268
DCP 9	.250	-0.734	-0.806	-0.873	-0.934	-1.005	-1.073	-1.140	-1.199
DCP10	.300	-0.645	-0.712	-0.780	-0.840	-0.908	-0.972	-1.040	-1.102
DCP11	.399	-0.632	-0.692	-0.748	-0.808	-0.866	-0.928	-0.990	-1.049
DCP12	.501	-0.600	-0.671	-0.727	-0.774	-0.830	-0.888	-0.941	-0.996
DCP13	.600	-0.546	-0.598	-0.650	-0.701	-0.759	-0.823	-0.877	-0.930
DCP14	.701	-0.380	-0.449	-0.518	-0.575	-0.631	-0.683	-0.723	-0.764
DCP15	.800	-0.109	-0.144	-0.171	-0.211	-0.255	-0.294	-0.337	-0.402
DCP16	.900	-0.118	-0.150	-0.200	-0.264	-0.336	-0.399	-0.435	-0.477
DCP17	.969	0.040	-0.234	-0.333	-0.304	-0.344	-0.380	-0.401	-0.426

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.849 Rn = 11.0 x 10^6 FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		-1.900	-1.359	-0.668	-0.086	0.824	1.301	1.737	2.370	2.898	3.573	4.422
CN		-0.162	-0.127	-0.036	0.026	0.104	0.181	0.247	0.310	0.384	0.479	0.584
CM		0.007	0.017	0.009	0.016	0.008	-0.005	-0.018	-0.023	-0.045	-0.077	-0.113
DCP 1	.010	-1.609	-1.542	-1.391	-1.267	-1.013	-0.800	-0.623	-0.498	-0.419	-0.277	-0.032
DCP 2	.020	-1.337	-1.244	-1.099	-0.910	-0.825	-0.688	-0.540	-0.370	-0.240	-0.102	0.023
DCP 3	.030	-1.107	-1.021	-0.876	-0.770	-0.623	-0.408	-0.287	-0.145	-0.042	0.083	0.195
DCP 4	.049	-0.703	-0.591	-0.462	-0.806	-0.094	-0.005	0.089	0.215	0.309	0.398	0.485
DCP 5	.074	-0.288	-0.260	-0.179	-0.096	-0.008	0.113	0.234	0.366	0.448	0.536	0.622
DCP 6	.099	-0.122	-0.058	0.029	0.115	0.295	0.399	0.466	0.557	0.621	0.695	0.773
DCP 7	.149	-0.041	0.031	0.126	0.293	0.376	0.476	0.534	0.624	0.684	0.749	0.819
DCP 8	.200	-0.089	-0.006	0.085	0.269	0.342	0.426	0.492	0.582	0.647	0.718	0.783
DCP 9	.250	-0.148	-0.028	0.103	0.236	0.332	0.434	0.503	0.587	0.650	0.712	0.781
DCP10	.300	-0.083	-0.004	0.184	0.252	0.355	0.448	0.507	0.581	0.639	0.693	0.753
DCP11	.399	-0.201	-0.051	0.142	0.241	0.343	0.412	0.462	0.533	0.583	0.642	0.706
DCP12	.501	-0.204	-0.044	0.092	0.187	0.281	0.347	0.400	0.471	0.519	0.575	0.633
DCP13	.600	-0.082	-0.067	0.056	0.191	0.277	0.339	0.385	0.460	0.508	0.558	0.616
DCP14	.701	0.024	0.053	0.151	0.225	0.284	0.340	0.423	0.504	0.545	0.608	0.665
DCP15	.800	-0.182	-0.426	-0.435	-0.354	-0.311	-0.219	-0.072	-0.047	0.133	0.440	0.806
DCP16	.900	-0.060	-0.087	-0.159	-0.522	-0.500	-0.403	-0.265	-0.227	-0.100	0.018	0.173
DCP17	.969	0.015	-0.025	-0.036	-0.008	-0.056	-0.099	-0.307	-0.424	-0.368	-0.240	-0.153

ALPHA		4.942	5.317	5.989	6.448	7.271	7.916	8.463	8.975
CN		0.670	0.749	0.812	0.870	0.926	0.982	1.038	1.092
CM		-0.142	-0.168	-0.182	-0.191	-0.200	-0.208	-0.217	-0.225
DCP 1	.010	0.063	0.255	0.386	0.552	0.643	0.780	0.922	1.075
DCP 2	.020	0.145	0.263	0.388	0.523	0.649	0.771	0.898	1.026
DCP 3	.030	0.296	0.398	0.498	0.605	0.713	0.824	0.928	1.025
DCP 4	.049	0.577	0.662	0.756	0.845	0.934	1.024	1.114	1.201
DCP 5	.074	0.700	0.778	0.866	0.964	1.053	1.136	1.217	1.298
DCP 6	.099	0.848	0.920	0.994	1.070	1.154	1.233	1.315	1.387
DCP 7	.149	0.882	0.944	1.017	1.091	1.162	1.232	1.299	1.371
DCP 8	.200	0.844	0.899	0.968	1.038	1.108	1.179	1.248	1.317
DCP 9	.250	0.840	0.898	0.964	1.026	1.091	1.161	1.229	1.291
DCP10	.300	0.812	0.866	0.924	0.989	1.051	1.112	1.175	1.234
DCP11	.399	0.765	0.817	0.875	0.942	0.999	1.064	1.125	1.183
DCP12	.501	0.688	0.742	0.798	0.858	0.914	0.974	1.036	1.093
DCP13	.600	0.672	0.723	0.781	0.836	0.893	0.949	1.001	1.056
DCP14	.701	0.743	0.794	0.844	0.889	0.939	0.989	1.034	1.081
DCP15	.800	0.875	0.920	0.960	1.007	1.045	1.080	1.121	1.152
DCP16	.900	0.497	0.764	0.796	0.821	0.853	0.882	0.916	0.946
DCP17	.969	-0.098	0.042	0.208	0.251	0.269	0.279	0.297	0.317

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.898 Rn = 3.6 x 10^6

FLOOR AND CEILING WITH 4.9% POROSITY

ALPHA		-4.757	-4.148	-3.615	-3.094	-2.258	-1.626	-0.976	-0.517	-0.074	0.721	1.276
CN		-0.460	-0.391	-0.321	-0.253	-0.180	-0.104	-0.033	0.041	0.124	0.197	0.259
CM		0.041	0.031	0.020	0.008	-0.005	-0.019	-0.032	-0.047	-0.063	-0.076	-0.085
DCP 1	.010	-1.743	-1.641	-1.552	-1.478	-1.432	-1.377	-1.288	-1.276	-1.159	-0.990	-0.778
DCP 2	.020	-1.610	-1.505	-1.413	-1.329	-1.274	-1.214	-1.157	-1.063	-0.934	-0.822	-0.719
DCP 3	.030	-1.415	-1.325	-1.241	-1.156	-1.071	-0.995	-0.918	-0.836	-0.785	-0.685	-0.516
DCP 4	.049	-1.059	-0.967	-0.867	-0.785	-0.693	-0.628	-0.528	-0.446	-0.369	-0.202	-0.082
DCP 5	.074	-0.804	-0.703	-0.599	-0.504	-0.415	-0.328	-0.245	-0.160	-0.090	-0.006	0.074
DCP 6	.099	-0.662	-0.5[illegible]5	-0.455	-0.361	-0.262	-0.178	-0.100	-0.004	0.062	0.119	0.215
DCP 7	.149	-0.631	-0.5[illegible]9	-0.409	-0.286	-0.199	-0.103	-0.033	0.049	0.140	0.262	0.347
DCP 8	.200	-0.625	-0.530	-0.424	-0.316	-0.187	-0.080	-0.003	0.052	0.133	0.282	0.345
DCP 9	.250	-0.609	-0.526	-0.443	-0.347	-0.244	-0.133	-0.045	0.017	0.158	0.244	0.306
DCP10	.300	-0.507	-0.424	-0.345	-0.271	-0.170	-0.072	0.010	0.077	0.214	0.271	0.333
DCP11	.399	-0.527	-0.452	-0.362	-0.295	-0.203	-0.116	-0.042	0.070	0.194	0.253	0.317
DCP12	.501	-0.485	-0.416	-0.343	-0.290	-0.253	-0.152	-0.035	0.091	0.163	0.222	0.278
DCP13	.600	-0.441	-0.386	-0.333	-0.266	-0.186	-0.119	-0.027	0.054	0.149	0.223	0.275
DCP14	.701	-0.321	-0.257	-0.196	-0.141	-0.077	0.003	0.062	0.119	0.186	0.248	0.315
DCP15	.800	-0.045	0.002	0.052	0.107	0.167	0.211	0.252	0.316	0.379	0.444	0.485
DCP16	.900	-0.092	-0.055	-0.007	0.035	0.090	0.140	0.181	0.215	0.273	0.320	0.352
DCP17	.969	-0.311	-0.284	-0.263	-0.225	-0.184	-0.150	-0.124	-0.088	-0.063	-0.011	0.022

ALPHA		1.900	2.660	3.179	3.720	4.313
CN		0.327	0.400	0.470	0.536	0.610
CM		-0.096	-0.109	-0.119	-0.130	-0.145
DCP 1	.010	-0.665	-0.545	-0.298	-0.146	0.026
DCP 2	.020	-0.559	-0.421	-0.268	-0.118	0.042
DCP 3	.030	-0.353	-0.202	-0.068	0.055	0.183
DCP 4	.049	0.017	0.139	0.273	0.381	0.490
DCP 5	.074	0.175	0.311	0.414	0.504	0.613
DCP 6	.099	0.341	0.444	0.538	0.616	0.704
DCP 7	.149	0.424	0.508	0.596	0.670	0.766
DCP 8	.200	0.420	0.506	0.600	0.656	0.737
DCP 9	.250	0.373	0.476	0.563	0.641	0.722
DCP10	.300	0.410	0.494	0.574	0.643	0.717
DCP11	.399	0.389	0.452	0.510	0.598	0.661
DCP12	.501	0.340	0.409	0.475	0.541	0.614
DCP13	.600	0.339	0.388	0.464	0.521	0.580
DCP14	.701	0.369	0.429	0.503	0.564	0.631
DCP15	.800	0.533	0.607	0.654	0.709	0.786
DCP16	.900	0.405	0.477	0.522	0.574	0.651
DCP17	.969	0.064	0.078	0.082	0.097	0.120

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.901 Rn = 7.2 x 10^6

ALPHA		-0.407	-1.316	-2.126	-3.051	-4.140	-5.028	-6.238	-7.077	-7.855		
CN		0.073	-0.037	-0.164	-0.283	-0.390	-0.492	-0.585	-0.682	-0.766		
CM		-0.050	-0.029	-0.007	0.013	0.030	0.048	0.064	0.079	0.094		
DCP 1	.010	-1.285	-1.404	-1.537	-1.805	-1.852	-1.871	-1.961	-2.088	-2.177		
DCP 2	.020	-0.985	-1.159	-1.310	-1.429	-1.543	-1.673	-1.780	-1.904	-2.019		
DCP 3	.030	-0.792	-0.942	-1.08	-1.206	-1.338	-1.470	-1.588	-1.729	-1.838		
DCP 4	.049	-0.416	-0.570	-0.72	-0.865	-1.004	-1.147	-1.260	-1.406	-1.522		
DCP 5	.074	-0.074	-0.170	-0.313	-0.512	-0.685	-0.841	-0.988	-1.133	-1.260		
DCP 6	.099	0.048	-0.029	-0.131	-0.322	-0.518	-0.695	-0.853	-1.014	-1.133		
DCP 7	.149	0.111	0.004	-0.156	-0.343	-0.518	-0.671	-0.796	-0.939	-1.052		
DCP 8	.200	0.117	0.006	-0.167	-0.365	-0.522	-0.655	-0.783	-0.909	-1.015		
DCP 9	.250	0.081	-0.010	-0.208	-0.375	-0.506	-0.625	-0.733	-0.855	-0.960		
DCP10	.300	0.118	0.012	-0.165	-0.311	-0.419	-0.543	-0.651	-0.766	-0.862		
DCP11	.399	0.140	-0.066	-0.215	-0.307	-0.451	-0.556	-0.640	-0.751	-0.831		
DCP12	.501	0.105	-0.067	-0.262	-0.315	-0.419	-0.518	-0.609	-0.720	-0.798		
DCP13	.600	0.061	-0.052	-0.161	-0.300	-0.387	-0.464	-0.570	-0.653	-0.727		
DCP14	.701	0.130	0.056	-0.074	-0.177	-0.243	-0.325	-0.452	-0.544	-0.621		
DCP15	.800	0.328	0.234	0.194	0.094	0.007	-0.087	-0.135	-0.202	-0.259		
DCP16	.900	0.228	0.181	0.119	0.025	-0.050	-0.104	-0.150	-0.246	-0.353		
DCP17	.969	-0.069	-0.136	-0.196	-0.256	-0.313	-0.366	-0.412	-0.371	-0.376		
ALPHA		-1.959	-1.336	-0.734	-0.026	0.724	1.357	1.782	2.405	2.985	3.494	4.166
CN		-0.111	-0.039	0.027	0.091	0.167	0.236	0.308	0.377	0.443	0.502	0.562
CM		-0.016	-0.028	-0.040	-0.054	-0.068	-0.079	-0.092	-0.103	-0.114	-0.122	-0.132
DCP 1	.010	-1.485	-1.414	-1.360	-1.267	-1.142	-0.924	-0.749	-0.608	-0.431	-0.353	-0.174
DCP 2	.020	-1.235	-1.145	-1.073	-0.946	-0.818	-0.751	-0.631	-0.462	-0.305	-0.151	-0.014
DCP 3	.030	-1.034	-0.954	-0.861	-0.780	-0.701	-0.585	-0.394	-0.261	-0.128	-0.003	0.120
DCP 4	.049	-0.666	-0.566	-0.481	-0.404	-0.293	-0.121	-0.026	0.091	0.205	0.314	0.412
DCP 5	.074	-0.206	-0.153	-0.095	-0.046	0.018	0.103	0.178	0.276	0.379	0.470	0.564
DCP 6	.099	-0.066	-0.038	0.024	0.058	0.131	0.190	0.305	0.421	0.509	0.590	0.679
DCP 7	.149	-0.067	0.008	0.088	0.148	0.189	0.354	0.414	0.493	0.574	0.653	0.727
DCP 8	.200	-0.091	0.008	0.070	0.121	0.266	0.320	0.401	0.471	0.554	0.631	0.702
DCP 9	.250	-0.116	-0.012	0.032	0.093	0.234	0.300	0.387	0.470	0.558	0.628	0.692
DCP10	.300	-0.088	0.009	0.068	0.124	0.248	0.313	0.402	0.488	0.552	0.616	0.678
DCP11	.399	-0.148	-0.066	0.030	0.171	0.221	0.292	0.375	0.439	0.497	0.563	0.624
DCP12	.501	-0.211	-0.073	0.077	0.110	0.180	0.249	0.321	0.380	0.444	0.507	0.562
DCP13	.600	-0.127	-0.053	0.009	0.065	0.180	0.254	0.318	0.369	0.430	0.486	0.542
DCP14	.701	0.003	0.059	0.096	0.156	0.210	0.268	0.341	0.406	0.472	0.533	0.595
DCP15	.800	0.207	0.232	0.261	0.346	0.413	0.467	0.520	0.560	0.630	0.672	0.712
DCP16	.900	0.138	0.173	0.200	0.247	0.296	0.341	0.389	0.447	0.497	0.530	0.578
DCP17	.969	-0.162	-0.133	-0.099	-0.062	-0.022	0.005	0.035	0.065	0.080	0.060	0.070

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

FLOOR AND CEILING WITH 4.9% POROSITY

M = 0.899 Rn = 11.0 x 10^6

ALPHA		-1.918	-1.337	-0.692	0.194	0.655	1.047	1.728	2.378	2.949	3.730
CN		-0.117	-0.050	0.015	0.078	0.151	0.222	0.297	0.364	0.423	0.485
CM		-0.016	-0.029	-0.041	-0.054	-0.068	-0.080	-0.093	-0.103	-0.113	-0.121
DCP 1	.010	-1.501	-1.476	-1.420	-1.357	-1.324	-1.031	-0.811	-0.662	-0.658	-0.344
DCP 2	.020	-1.268	-1.204	-1.120	-0.993	-0.855	-0.787	-0.690	-0.522	-0.373	-0.226
DCP 3	.030	-1.069	-0.998	-0.896	-0.796	-0.721	-0.635	-0.441	-0.293	-0.166	-0.040
DCP 4	.049	-0.693	-0.605	-0.514	-0.426	-0.324	-0.138	-0.050	0.058	0.160	0.270
DCP 5	.074	-0.263	-0.233	-0.201	-0.145	-0.086	-0.018	0.055	0.194	0.319	0.423
DCP 6	.099	-0.132	-0.073	-0.005	0.040	0.118	0.161	0.325	0.407	0.484	0.571
DCP 7	.149	-0.038	0.020	0.080	0.137	0.184	0.334	0.413	0.488	0.557	0.632
DCP 8	.200	-0.088	-0.014	0.048	0.106	0.240	0.299	0.370	0.451	0.526	0.603
DCP 9	.250	-0.150	-0.035	0.020	0.083	0.207	0.282	0.364	0.452	0.525	0.601
DCP10	.300	-0.099	-0.008	0.059	0.124	0.227	0.299	0.385	0.466	0.531	0.590
DCP11	.399	-0.167	-0.088	0.029	0.161	0.200	0.280	0.359	0.426	0.479	0.544
DCP12	.501	-0.225	-0.089	0.053	0.090	0.166	0.236	0.310	0.367	0.416	0.480
DCP13	.600	-0.113	-0.058	-0.017	0.064	0.170	0.240	0.311	0.359	0.412	0.472
DCP14	.701	-0.006	0.061	0.096	0.144	0.199	0.252	0.334	0.389	0.451	0.511
DCP15	.800	0.215	0.239	0.290	0.348	0.409	0.469	0.517	0.572	0.617	0.657
DCP16	.900	0.143	0.182	0.218	0.246	0.303	0.351	0.398	0.446	0.493	0.523
DCP17	.969	-0.160	-0.131	-0.099	-0.056	-0.017	0.015	0.047	0.092	0.118	0.121

ALPHA		-0.206	-1.198	-2.179	-3.204	-4.096	-4.944	-5.810	-6.617
CN		0.064	-0.037	-0.147	-0.264	-0.377	-0.472	-0.558	-0.640
CM		-0.050	-0.030	-0.012	0.010	0.028	0.044	0.059	0.071
DCP 1	.010	-1.290	-1.573	-1.633	-1.778	-1.849	-1.889	-2.020	-2.064
DCP 2	.020	-1.039	-1.168	-1.333	-1.426	-1.563	-1.676	-1.780	-1.889
DCP 3	.030	-0.830	-0.967	-1.120	-1.226	-1.350	-1.473	-1.578	-1.691
DCP 4	.049	-0.440	-0.569	-0.736	-0.851	-0.992	-1.115	-1.230	-1.350
DCP 5	.074	-0.113	-0.190	-0.253	-0.363	-0.561	-0.754	-0.904	-1.049
DCP 6	.099	0.036	-0.045	-0.144	-0.280	-0.498	-0.677	-0.815	-0.950
DCP 7	.149	0.118	0.033	-0.063	-0.306	-0.511	-0.659	-0.777	-0.893
DCP 8	.200	0.087	-0.001	-0.135	-0.358	-0.505	-0.622	-0.730	-0.846
DCP 9	.250	0.061	-0.021	-0.203	-0.365	-0.493	-0.604	-0.704	-0.810
DCP10	.300	0.098	-0.004	-0.154	-0.297	-0.400	-0.522	-0.624	-0.724
DCP11	.399	0.151	-0.072	-0.216	-0.287	-0.432	-0.533	-0.614	-0.702
DCP12	.501	0.081	-0.029	-0.249	-0.305	-0.414	-0.493	-0.580	-0.676
DCP13	.600	0.039	-0.065	-0.149	-0.289	-0.383	-0.449	-0.537	-0.614
DCP14	.701	0.128	0.063	-0.027	-0.161	-0.233	-0.303	-0.395	-0.492
DCP15	.800	0.327	0.241	0.211	0.122	0.024	-0.069	-0.124	-0.163
DCP16	.900	0.237	0.183	0.132	0.031	-0.034	-0.088	-0.125	-0.166
DCP17	.969	-0.067	-0.126	-0.182	-0.247	-0.311	-0.391	-0.444	-0.459

MEASURED DRAG COEFFICIENTS

Airfoil: NLR7223-62 Test: BSWT567

M = 0.6 Re = 10 x 10^6		M = 0.7 Re = 11 x 10^6		M = 0.75 Re = 11.4 x 10^6		M = 0.8 Re = 11.7 x 10^6	
α	C_d	α	C_d	α	C_d	α	C_d
- 2.0	0.0092	-2.06	0.0088	-2.15	0.0093	-2.04	0.0159
- 1.98	0.0081	-1.33	0.0073	-2.10	0.0108	-1.01	0.0102
- 1.91	0.0082	-1.12	0.0083	-1.6	0.0070	-1.01	0.0100
0.58	0.0077	1.01	0.0083	-1.24	0.0083	-0.03	0.0107
0.71	0.0075	1.95	0.0104	-1.01	0.0082	-0.02	0.0099
1.07	0.0069	3.12	0.01367	0.15	0.0076	0.76	0.0120
2.10	0.0070	3.95	0.0228	0.91	0.0096	0.93	0.014
2.10	0.0076	5.05	0.0416	0.96	0.0089		
3.03	0.0082			1.12	0.0099		
4.07	0.0082			1.69	0.0158		
4.11	0.0081			1.99	0.0160		
5.06	0.0118			2.72	0.0223		
5.74	0.0176			2.87	0.0255		
5.79	0.0179						
6.02	0.0179						
7.04	0.0290						
7.95	0.0453						
9.01	0.0560						
10.09	0.0803						

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.201 Rn = 3.2 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-7.887	-7.305	-6.652	-6.069	-5.505	-4.914	-4.284	-3.728	-3.102	-2.506	-1.847
CN		-0.459	-0.437	-0.469	-0.403	-0.357	-0.294	-0.252	-0.180	-0.147	-0.075	-0.022
CM		-0.044	-0.031	-0.032	-0.033	-0.032	-0.033	-0.026	-0.033	-0.025	-0.026	-0.026
DCP 1	.010	-2.418	-2.518	-5.307	-4.764	-4.360	-3.826	-3.544	-2.931	-2.504	-2.162	-1.682
DCP 2	.020	-2.362	-2.697	-3.459	-3.165	-2.860	-2.590	-2.429	-2.160	-1.835	-1.492	-1.292
DCP 3	.030	-2.218	-2.837	-2.476	-2.232	-2.034	-1.832	-1.593	-1.403	-1.123	-0.954	-0.654
DCP 4	.049	-2.737	-2.131	-2.139	-1.889	-1.733	-1.490	-1.410	-1.193	-0.979	-0.842	-0.651
DCP 5	.074	-2.026	-1.602	-1.463	-1.298	-1.207	-0.969	-0.865	-0.752	-0.633	-0.407	-0.255
DCP 6	.099	-1.451	-1.058	-1.025	-0.862	-0.740	-0.666	-0.450	-0.345	-0.240	-0.131	0.041
DCP 7	.149	-1.114	-0.928	-0.866	-0.800	-0.695	-0.570	-0.513	-0.421	-0.301	-0.152	-0.091
DCP 8	.200	-0.851	-0.700	-0.644	-0.547	-0.515	-0.378	-0.323	-0.269	-0.243	-0.115	0.009
DCP 9	.250	-0.574	-0.617	-0.568	-0.472	-0.406	-0.296	-0.305	-0.198	-0.133	-0.034	0.021
DCP10	.300	-0.453	-0.404	-0.442	-0.417	-0.352	-0.326	-0.203	-0.131	-0.087	0.008	0.036
DCP11	.399	-0.277	-0.332	-0.345	-0.269	-0.224	-0.229	-0.100	-0.150	-0.038	0.053	0.047
DCP12	.501	-0.197	-0.230	-0.281	-0.239	-0.217	-0.158	-0.156	-0.016	-0.085	0.015	0.026
DCP13	.600	-0.075	-0.096	-0.071	-0.055	-0.032	-0.005	0.035	0.129	0.083	0.121	0.174
DCP14	.701	-0.001	-0.057	-0.073	-0.032	-0.017	0.012	0.031	0.105	0.089	0.056	0.122
DCP15	.800	-0.005	-0.018	-0.029	0.034	0.037	0.056	0.039	0.042	0.038	0.060	0.046
DCP16	.900	0.036	0.009	-0.111	-0.056	-0.079	-0.045	-0.089	-0.095	-0.093	-0.051	-0.060
DCP17	.969	0.009	-0.013	0.078	-0.017	0.016	0.040	-0.082	0.011	-0.018	-0.041	0.010

ALPHA		-1.285	-0.712	-0.068	0.572	1.104	1.696	2.357	2.943	3.521	4.186	4.801
CN		0.021	0.082	0.144	0.195	0.265	0.312	0.371	0.454	0.528	0.568	0.618
CM		-0.022	-0.021	-0.023	-0.020	-0.020	-0.020	-0.018	-0.022	-0.024	-0.015	-0.016
DCP 1	.010	-1.310	-0.898	-0.577	-0.178	0.280	0.664	0.994	1.477	1.863	2.240	2.542
DCP 2	.020	-1.053	-0.705	-0.420	-0.179	0.212	0.473	0.741	1.123	1.440	1.814	1.921
DCP 3	.030	-0.501	-0.223	0.053	0.294	0.508	0.745	1.099	1.280	1.596	1.917	2.145
DCP 4	.049	-0.345	-0.259	-0.073	0.175	0.401	0.615	0.745	1.065	1.255	1.456	1.713
DCP 5	.074	-0.153	0.053	0.236	0.368	0.511	0.720	0.888	1.085	1.254	1.431	1.616
DCP 6	.099	0.192	0.256	0.474	0.614	0.747	0.832	1.062	1.201	1.320	1.534	1.627
DCP 7	.149	-0.003	0.088	0.237	0.293	0.478	0.579	0.620	0.782	0.955	1.016	1.057
DCP 8	.200	0.009	0.203	0.265	0.351	0.386	0.502	0.684	0.692	0.800	0.947	0.574
DCP 9	.250	0.114	0.150	0.233	0.301	0.467	0.448	0.502	0.633	0.678	0.716	0.789
DCP10	.300	0.096	0.085	0.178	0.303	0.328	0.379	0.468	0.565	0.615	0.689	0.698
DCP11	.399	0.082	0.207	0.187	0.209	0.331	0.321	0.361	0.480	0.557	0.534	0.622
DCP12	.501	0.046	0.084	0.153	0.157	0.218	0.206	0.228	0.320	0.389	0.374	0.471
DCP13	.600	0.143	0.251	0.249	0.252	0.305	0.333	0.351	0.348	0.443	0.473	0.464
DCP14	.701	0.152	0.195	0.161	0.198	0.183	0.210	0.269	0.291	0.374	0.331	0.342
DCP15	.800	0.069	0.058	0.110	0.117	0.143	0.154	0.170	0.207	0.223	0.197	0.205
DCP16	.900	-0.056	-0.126	-0.011	-0.045	-0.044	-0.003	-0.017	0.000	-0.040	-0.002	-0.002
DCP17	.969	-0.036	-0.029	-0.081	-0.030	-0.058	-0.014	-0.056	0.019	-0.019	-0.057	-0.035

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.201 Rn = 3.2 x 10^6 SOLID FLOOR AND CEILING

ALPHA		5.351	5.960	6.575	7.194	7.740	8.380	9.013	9.610	10.164	10.773	11.381
CN		0.701	0.752	0.809	0.860	0.912	0.965	1.014	1.101	1.145	1.192	1.251
CM		-0.017	-0.018	-0.014	-0.015	-0.011	-0.009	-0.011	-0.007	-0.007	-0.004	-0.001
DCP 1	.010	2.959	3.329	3.651	4.043	4.475	4.916	5.291	5.867	5.568	5.933	6.010
DCP 2	.020	2.337	2.659	2.943	3.050	3.560	3.848	3.999	4.380	4.750	5.008	5.210
DCP 3	.030	2.426	2.626	2.822	3.134	3.368	3.672	3.846	4.152	4.409	4.609	4.925
DCP 4	.049	1.899	2.149	2.342	2.519	2.724	3.099	3.002	3.461	3.657	3.871	3.986
DCP 5	.074	1.724	1.982	2.095	2.223	2.420	2.714	2.721	2.941	3.075	3.251	3.473
DCP 6	.099	1.749	1.887	2.049	2.191	2.318	2.387	2.530	2.768	2.898	3.022	3.233
DCP 7	.149	1.291	1.359	1.460	1.537	1.662	1.831	1.818	1.964	2.117	2.255	2.354
DCP 8	.200	1.050	1.163	1.252	1.392	1.417	1.493	1.642	1.678	1.681	1.824	1.950
DCP 9	.250	0.935	1.006	1.097	1.120	1.217	1.290	1.337	1.492	1.494	1.632	1.704
DCP10	.300	0.871	0.868	1.007	0.990	1.051	1.109	1.139	1.231	1.315	1.332	1.397
DCP11	.399	0.676	0.724	0.762	0.828	0.826	0.992	0.940	1.076	1.037	1.090	1.194
DCP12	.501	0.539	0.529	0.540	0.586	0.630	0.686	0.704	0.736	0.825	0.818	0.893
DCP13	.600	0.545	0.488	0.585	0.613	0.624	0.685	0.640	0.745	0.753	0.740	0.707
DCP14	.701	0.376	0.415	0.410	0.385	0.514	0.500	0.476	0.515	0.488	0.504	0.555
DCP15	.800	0.191	0.233	0.224	0.327	0.259	0.260	0.318	0.282	0.318	0.299	0.266
DCP16	.900	0.016	0.066	0.054	0.036	-0.024	-0.002	0.035	0.005	0.001	0.051	0.031
DCP17	.969	-0.057	-0.020	-0.063	-0.094	-0.052	-0.094	-0.020	-0.049	0.019	-0.018	-0.009

ALPHA		11.972	12.537	13.173	13.812	14.384	14.972	15.547	16.743	17.970	19.126	19.702
CN		1.280	1.336	1.368	1.305	1.377	1.297	1.315	1.227	1.097	1.173	1.107
CM		-0.004	-0.006	-0.004	0.010	-0.001	-0.010	-0.066	-0.085	-0.118	-0.143	-0.114
DCP 1	.010	6.119	6.433	6.696	6.627	7.124	6.802	5.171	5.108	2.370	1.809	1.868
DCP 2	.020	5.472	5.799	6.003	5.908	6.240	5.964	4.446	4.259	2.113	1.642	1.791
DCP 3	.030	5.102	5.358	5.573	5.462	5.823	5.558	3.681	3.520	2.176	1.842	1.751
DCP 4	.049	4.220	4.340	4.481	4.255	4.324	3.993	3.935	3.683	3.065	3.564	3.586
DCP 5	.074	3.577	3.718	3.811	3.696	3.735	3.248	3.250	2.865	2.413	2.738	2.742
DCP 6	.099	3.257	3.367	3.364	3.324	3.414	2.923	2.719	2.440	1.561	2.222	2.241
DCP 7	.149	2.376	2.505	2.547	2.476	2.473	2.207	1.588	1.772	1.609	1.762	1.804
DCP 8	.200	1.971	2.011	2.054	2.089	2.122	1.994	1.873	1.655	1.445	1.343	1.374
DCP 9	.250	1.705	1.765	1.803	1.714	1.858	1.788	1.716	1.489	1.203	1.309	1.201
DCP10	.300	1.446	1.485	1.522	1.512	1.559	1.544	1.647	1.347	1.218	1.155	1.192
DCP11	.399	1.149	1.270	1.255	1.204	1.282	1.287	1.482	1.306	1.232	1.194	1.147
DCP12	.501	0.854	0.896	1.012	0.892	0.938	0.967	1.061	0.990	0.997	1.151	0.585
DCP13	.600	0.762	0.749	0.839	0.768	0.832	0.763	0.921	0.972	1.067	1.105	0.989
DCP14	.701	0.555	0.606	0.503	0.476	0.598	0.491	0.681	0.739	0.785	0.972	0.838
DCP15	.800	0.392	0.307	0.371	0.257	0.317	0.295	0.536	0.516	0.680	0.831	0.733
DCP16	.900	0.057	0.157	0.076	0.026	0.064	0.143	0.198	0.382	0.370	0.502	0.347
DCP17	.969	-0.080	-0.034	-0.024	-0.031	-0.044	-0.006	0.120	0.106	0.115	0.092	0.081

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.301 Rn = 4.8 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-9.574	-8.588	-8.371	-7.793	-7.229	-6.615	-5.573	-5.411	-4.848	-4.194	-3.575
CN		-0.637	-0.590	-0.580	-0.526	-0.494	-0.502	-0.459	-0.405	-0.351	-0.287	-0.231
CM		-0.024	-0.039	-0.027	-0.029	-0.025	-0.031	-0.027	-0.027	-0.025	-0.025	-0.023
DCP 1	.010	-3.211	-3.502	-2.301	-2.470	-2.601	-5.201	-5.021	-4.690	-4.220	-3.655	-3.172
DCP 2	.020	-2.488	-2.272	-2.456	-2.775	-2.996	-3.502	-3.271	-3.038	-2.719	-2.373	-2.164
DCP 3	.030	-2.188	-2.128	-3.396	-3.265	-2.809	-2.685	-2.486	-2.205	-2.053	-1.745	-1.539
DCP 4	.049	-1.950	-2.038	-2.365	-2.243	-2.155	-2.031	-1.869	-1.641	-1.451	-1.284	-1.120
DCP 5	.074	-1.888	-1.998	-1.846	-1.747	-1.630	-1.480	-1.347	-1.183	-1.046	-0.871	-0.690
DCP 6	.099	-1.533	-1.639	-1.505	-1.346	-1.267	-1.163	-1.053	-0.896	-0.763	-0.634	-0.462
DCP 7	.149	-1.413	-1.578	-1.278	-1.118	-1.011	-0.929	-0.834	-0.740	-0.593	-0.491	-0.408
DCP 8	.200	-1.293	-1.342	-0.963	-0.999	-0.892	-0.757	-0.677	-0.640	-0.539	-0.440	-0.347
DCP 9	.250	-1.259	-1.076	-0.968	-0.795	-0.667	-0.624	-0.563	-0.518	-0.455	-0.385	-0.268
DCP10	.300	-0.958	-0.827	-0.757	-0.591	-0.533	-0.506	-0.470	-0.376	-0.325	-0.272	-0.199
DCP1I	.399	-0.663	-0.454	-0.488	-0.346	-0.325	-0.379	-0.342	-0.282	-0.240	-0.185	-0.158
DCP12	.501	-0.396	-0.274	-0.312	-0.278	-0.296	-0.307	-0.248	-0.231	-0.213	-0.128	-0.130
DCP13	.600	-0.201	-0.129	-0.198	-0.184	-0.172	-0.190	-0.150	-0.120	-0.097	-0.086	-0.034
DCP14	.701	0.003	0.031	-0.040	-0.031	-0.035	0.016	-0.003	0.018	0.048	0.057	0.097
DCP15	.800	-0.001	0.021	-0.009	-0.015	-0.011	-0.036	-0.008	-0.033	-0.009	0.005	0.025
DCP16	.900	-0.048	-0.035	-0.081	-0.072	-0.078	-0.083	-0.134	-0.101	-0.108	-0.092	-0.086
DCP17	.969	0.009	0.027	0.027	-0.001	-0.032	0.015	-0.000	0.022	-0.006	0.018	-0.040

ALPHA		-2.996	-2.416	-1.798	-1.187	-0.580	-0.030	0.636	1.248	1.810	2.409	3.067
CN		-0.171	-0.119	-0.047	0.006	0.071	0.125	0.186	0.244	0.305	0.380	0.444
CM		-0.020	-0.018	-0.020	-0.020	-0.018	-0.018	-0.017	-0.018	-0.014	-0.018	-0.015
DCP 1	.010	-2.610	-2.135	-1.721	-1.275	-0.886	-0.489	-0.134	0.288	0.748	1.085	1.489
DCP 2	.020	-1.807	-1.518	-1.172	-0.899	-0.592	-0.290	0.008	0.270	0.667	0.976	1.279
DCP 3	.030	-1.272	-1.043	-0.765	-0.537	-0.281	-0.057	0.217	0.468	0.748	1.012	1.303
DCP 4	.049	-0.863	-0.695	-0.495	-0.289	-0.042	0.135	0.334	0.559	0.769	1.005	1.207
DCP 5	.074	-0.567	-0.379	-0.166	-0.040	0.115	0.303	0.466	0.631	0.796	1.010	1.182
DCP 6	.099	-0.324	-0.195	-0.067	0.079	0.209	0.346	0.527	0.659	0.808	0.932	1.120
DCP 7	.149	-0.262	-0.186	-0.057	0.012	0.165	0.268	0.376	0.463	0.581	0.725	0.818
DCP 8	.200	-0.267	-0.178	-0.077	0.021	0.080	0.209	0.279	0.368	0.414	0.567	0.668
DCP 9	.250	-0.219	-0.148	-0.030	0.001	0.110	0.180	0.264	0.286	0.395	0.501	0.581
DCP10	.300	-0.136	-0.091	-0.001	0.051	0.143	0.170	0.252	0.319	0.387	0.469	0.541
DCP11	.399	-0.105	-0.052	-0.002	0.050	0.117	0.152	0.189	0.259	0.326	0.362	0.445
DCP12	.501	-0.078	-0.040	0.005	0.037	0.085	0.104	0.166	0.188	0.250	0.267	0.327
DCP13	.600	-0.025	0.006	0.040	0.073	0.126	0.122	0.167	0.165	0.230	0.278	0.304
DCP14	.701	0.104	0.110	0.166	0.190	0.194	0.220	0.237	0.259	0.272	0.303	0.364
DCP15	.800	0.056	0.048	0.062	0.066	0.098	0.114	0.130	0.151	0.152	0.177	0.178
DCP16	.900	-0.121	-0.114	-0.087	-0.061	-0.107	-0.061	-0.094	-0.038	-0.085	-0.005	-0.073
DCP17	.969	-0.010	-0.006	-0.019	-0.040	-0.023	-0.028	-0.004	-0.020	-0.042	-0.030	-0.024

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.301 Rn = 4.8 x 10^6

SOLID FLOOR AND CEILING

ALPHA		3.628	4.230	4.656	5.501	6.035	6.638	7.341	7.857	8.466	9.042	9.670
CN		0.500	0.552	0.618	0.682	0.745	0.797	0.862	0.912	0.968	1.028	1.081
CM		-0.014	-0.011	-0.010	-0.009	-0.011	-0.008	-0.008	-0.006	-0.002	-0.001	-0.002
DCP 1	.010	1.893	2.252	2.640	3.041	3.430	3.804	4.198	4.707	5.122	5.388	5.542
DCP 2	.020	1.583	1.921	2.220	2.501	2.829	3.119	3.469	3.738	4.131	4.373	4.600
DCP 3	.030	1.584	1.814	2.111	2.412	2.583	2.842	3.162	3.395	3.670	3.908	4.146
DCP 4	.049	1.454	1.674	1.853	2.139	2.355	2.553	2.757	2.981	3.237	3.405	3.572
DCP 5	.074	1.323	1.524	1.683	1.895	2.016	2.218	2.408	2.558	2.710	2.934	3.065
DCP 6	.099	1.298	1.378	1.537	1.720	1.840	1.942	2.152	2.262	2.396	2.551	2.681
DCP 7	.149	0.933	1.044	1.191	1.242	1.382	1.511	1.607	1.687	1.838	1.932	1.993
DCP 8	.200	0.719	0.822	0.935	1.041	1.107	1.219	1.262	1.365	1.406	1.557	1.648
DCP 9	.250	0.660	0.717	0.798	0.892	0.975	1.035	1.114	1.171	1.271	1.338	1.426
DCP10	.300	0.599	0.661	0.715	0.782	0.845	0.920	0.970	1.045	1.099	1.158	1.200
DCP11	.399	0.496	0.555	0.616	0.655	0.732	0.748	0.791	0.823	0.862	0.932	1.017
DCP12	.501	0.362	0.359	0.461	0.462	0.530	0.546	0.623	0.635	0.665	0.721	0.776
DCP13	.600	0.331	0.357	0.374	0.449	0.445	0.480	0.519	0.553	0.596	0.580	0.605
DCP14	.701	0.349	0.370	0.377	0.417	0.449	0.447	0.477	0.465	0.490	0.508	0.521
DCP15	.800	0.186	0.188	0.205	0.217	0.243	0.258	0.271	0.249	0.270	0.301	0.295
DCP16	.900	-0.050	-0.046	-0.042	-0.054	-0.025	-0.050	-0.018	0.026	-0.022	-0.046	-0.011
DCP17	.969	-0.012	-0.026	-0.042	-0.033	-0.047	-0.006	-0.050	-0.036	-0.051	-0.018	-0.030

ALPHA		10.274	10.866	11.447	12.124	12.626	13.226	13.818	14.505	15.011	15.641	16.245
CN		1.125	1.172	1.202	1.251	1.267	1.268	1.196	1.234	1.170	1.127	1.227
CM		0.003	0.004	0.007	0.007	0.009	0.011	0.003	-0.005	-0.074	-0.066	-0.070
DCP 1	.010	5.559	6.355	6.779	7.273	7.692	7.777	7.028	6.659	4.798	4.681	4.840
DCP 2	.020	4.900	5.147	5.305	5.443	5.520	5.794	5.662	5.338	4.097	4.205	4.189
DCP 3	.030	4.402	4.645	4.804	5.029	5.094	5.232	5.081	4.725	3.675	3.779	3.166
DCP 4	.049	3.805	3.981	4.090	4.228	4.359	4.358	3.901	4.176	3.287	3.257	3.601
DCP 5	.074	3.188	3.357	3.472	3.590	3.603	3.641	3.178	3.461	2.536	2.425	2.901
DCP 6	.099	2.816	2.940	2.978	3.141	3.184	3.120	2.736	2.995	2.129	2.136	2.399
DCP 7	.149	2.116	2.258	2.284	2.325	2.384	2.400	2.192	2.206	1.694	1.674	2.005
DCP 8	.200	1.692	1.743	1.842	1.876	1.901	1.944	1.814	1.912	1.503	1.512	1.797
DCP 9	.250	1.468	1.534	1.591	1.628	1.692	1.645	1.637	1.607	1.559	1.408	1.606
DCP10	.300	1.269	1.331	1.333	1.391	1.421	1.420	1.380	1.433	1.385	1.404	1.483
DCP11	.399	1.036	1.035	1.070	1.125	1.118	1.110	1.125	1.122	1.318	1.172	1.230
DCP12	.501	0.799	0.793	0.813	0.884	0.856	0.816	0.846	0.884	1.040	1.011	1.045
DCP13	.600	0.629	0.625	0.654	0.677	0.649	0.665	0.620	0.664	0.884	0.808	0.925
DCP14	.701	0.522	0.572	0.544	0.550	0.518	0.548	0.454	0.485	0.724	0.692	0.737
DCP15	.800	0.285	0.295	0.299	0.279	0.293	0.272	0.259	0.312	0.524	0.472	0.483
DCP16	.900	-0.0[illegible]	0.008	0.000	0.014	0.056	0.042	0.083	0.119	0.194	0.242	0.192
DCP17	.969	-0.0[illegible]	-0.061	-0.053	-0.016	-0.001	-0.010	0.039	0.051	0.069	0.039	0.140

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.301 Rn = 4.8 x 10^6 SOLID FLOOR AND CEILING

ALPHA		16.852	17.410	18.003	18.617	19.242	19.792
CN		1.007	1.003	1.038	0.966	1.011	0.990
CM		-0.101	-0.091	-0.090	-0.095	-0.102	-0.093
DCP 1	.010	4.031	3.909	3.914	3.568	3.615	3.725
DCP 2	.020	3.691	3.642	3.662	3.389	3.262	3.289
DCP 3	.030	3.789	3.646	3.091	3.322	2.934	2.065
DCP 4	.049	2.034	2.087	2.497	1.858	1.909	2.229
DCP 5	.074	1.414	1.455	1.768	1.430	1.546	1.751
DCP 6	.099	1.315	1.428	1.628	1.371	1.470	1.643
DCP 7	.149	1.205	1.318	1.496	1.254	1.391	1.490
DCP 8	.200	1.215	1.231	1.422	1.253	1.363	1.382
DCP 9	.250	1.276	1.285	1.368	1.272	1.351	1.265
DCP10	.300	1.174	1.258	1.250	1.202	1.244	1.192
DCP11	.399	1.149	1.188	1.124	1.103	1.097	1.091
DCP12	.501	1.060	1.029	0.955	0.912	1.080	0.558
DCP13	.600	0.917	0.816	0.830	0.831	0.895	0.785
DCP14	.701	0.787	0.710	0.736	0.741	0.696	0.686
DCP15	.800	0.543	0.495	0.528	0.534	0.550	0.568
DCP16	.900	0.244	0.264	0.290	0.257	0.302	0.290
DCP17	.969	0.104	0.100	0.112	0.123	0.121	0.094

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 2.3 x 10^6 SOLID FLOOR AND CEILING

DATA TYPE	X/C										
ALPHA		-8.284	-7.801	-7.278	-6.785	-6.234	-5.727	-5.209	-4.697	-4.145	-3.661	-3.107
CN		-0.595	-0.567	-0.542	-0.503	-0.462	-0.448	-0.395	-0.372	-0.303	-0.245	-0.194
CM		-0.010	-0.016	-0.027	-0.036	-0.046	-0.036	-0.036	-0.034	-0.029	-0.027	-0.020
DCP 1	.010	-2.265	-2.365	-2.194	-2.263	-2.362	-2.477	-2.569	-3.293	-3.663	-3.220	-2.740
DCP 2	.020	-2.293	-2.401	-2.211	-2.313	-2.366	-2.427	-2.440	-2.800	-2.473	-2.084	-1.759
DCP 3	.030	-2.294	-2.491	-1.958	-1.985	-2.007	-2.051	-2.168	-2.246	-1.802	-1.597	-1.354
DCP 4	.049	-1.763	-1.758	-1.863	-1.960	-2.053	-2.032	-2.081	-2.023	-1.334	-1.147	-0.989
DCP 5	.074	-1.565	-1.559	-1.707	-1.792	-1.865	-1.768	-1.715	-1.554	-0.977	-0.763	-0.616
DCP 6	.099	-1.326	-1.365	-1.465	-1.540	-1.580	-1.509	-1.214	-1.019	-0.656	-0.553	-0.355
DCP 7	.149	-1.357	-1.343	-1.414	-1.384	-1.455	-1.273	-0.958	-0.690	-0.637	-0.519	-0.398
DCP 8	.200	-1.129	-1.125	-1.137	-1.017	-0.869	-0.724	-0.556	-0.454	-0.430	-0.333	-0.216
DCP 9	.250	-1.085	-1.047	-1.009	-0.834	-0.695	-0.600	-0.436	-0.441	-0.406	-0.337	-0.237
DCP10	.300	-0.919	-0.877	-0.767	-0.694	-0.497	-0.467	-0.409	-0.357	-0.341	-0.268	-0.179
DCP11	.349	-0.651	-0.583	-0.516	-0.361	-0.345	-0.333	-0.255	-0.257	-0.226	-0.149	-0.120
DCP12	.501	-0.347	-0.394	-0.278	-0.277	-0.166	-0.183	-0.208	-0.175	-0.156	-0.109	-0.102
DCP13	.600	-0.226	-0.200	-0.131	-0.101	-0.064	-0.070	-0.054	-0.064	-0.048	-0.006	-0.045
DCP14	.701	-0.078	-0.026	0.001	0.051	0.077	0.001	0.022	0.024	0.075	0.069	0.060
DCP15	.800	0.010	0.013	0.092	0.074	0.083	0.082	0.074	0.068	0.092	0.076	0.060
DCP16	.900	-0.093	-0.090	-0.065	-0.067	-0.054	-0.073	-0.062	-0.113	-0.117	-0.101	-0.103
DCP17	.969	-0.052	-0.038	-0.088	-0.014	0.031	-0.019	-0.024	-0.001	-0.031	-0.044	-0.030

DATA TYPE	X/C										
ALPHA		-2.584	-2.071	-1.534	-1.014	-0.486	0.073	0.554	1.092	1.636	2.137	2.649
CN		-0.133	-0.073	-0.008	0.045	0.113	0.171	0.214	0.262	0.345	0.404	0.453
CM		-0.023	-0.020	-0.019	0.018	-0.020	-0.017	-0.008	-0.012	-0.013	-0.008	-0.303
DCP 1	.010	-2.192	-1.760	-1.334	-0.896	-0.514	-0.121	0.317	0.676	1.077	1.493	1.872
DCP 2	.020	-1.534	-1.445	-1.074	-0.754	-0.462	-0.214	0.122	0.439	0.742	1.006	1.380
DCP 3	.030	-1.092	-0.834	-0.607	-0.349	-0.088	0.175	0.444	0.683	0.945	1.239	1.518
DCP 4	.049	-0.803	-0.577	-0.413	-0.156	0.006	0.263	0.457	0.683	0.881	1.099	1.331
DCP 5	.074	-0.462	-0.260	-0.047	0.034	0.228	0.398	0.547	0.754	0.936	1.106	1.254
DCP 6	.099	-0.258	-0.069	0.095	0.212	0.336	0.469	0.672	0.780	0.934	1.153	1.237
DCP 7	.149	-0.290	-0.151	-0.057	0.033	0.173	0.269	0.368	0.490	0.592	0.741	0.854
DCP 8	.200	-0.162	-0.049	0.056	0.107	0.244	0.305	0.413	0.403	0.572	0.608	0.757
DCP 9	.250	-0.203	-0.056	0.025	0.042	0.155	0.217	0.276	0.396	0.462	0.539	0.563
DCP10	.300	-0.137	-0.062	0.029	0.077	0.136	0.237	0.281	0.338	0.364	0.491	0.533
DCP11	.349	-0.054	-0.034	0.045	0.088	0.128	0.223	0.250	0.314	0.345	0.381	0.459
DCP12	.501	-0.042	-0.031	0.031	0.059	0.122	0.143	0.173	0.217	0.305	0.337	0.332
DCP13	.600	0.037	0.072	0.066	0.158	0.180	0.216	0.200	0.239	0.256	0.249	0.324
DCP14	.701	0.143	0.127	0.136	0.163	0.170	0.193	0.200	0.225	0.264	0.310	0.301
DCP15	.800	0.083	0.114	0.127	0.115	0.163	0.147	0.130	0.147	0.175	0.149	0.157
DCP16	.900	-0.081	-0.112	-0.094	-0.115	-0.073	-0.111	-0.137	-0.071	-0.078	-0.090	-0.131
DCP17	.969	-0.072	-0.061	-0.059	-0.046	-0.065	-0.018	-0.060	-0.078	-0.069	-0.072	-0.064

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 2.3 x 10^6 SOLID FLOOR AND CEILING

DATA TYPE	X/C										
ALPHA		3.169	3.708	4.237	4.722	5.286	5.792	6.287	6.818	7.369	7.848	8.391
CN		0.530	0.594	0.651	0.717	0.768	0.829	0.861	0.914	0.950	1.009	1.030
CM		-0.009	-0.009	-0.003	-0.004	-0.003	0.002	0.006	0.008	0.013	0.014	0.018
DCP 1	.010	2.298	2.654	3.021	3.424	3.744	4.205	4.566	5.097	5.541	6.021	6.257
DCP 2	.020	1.711	2.023	2.267	2.683	2.870	3.328	3.794	3.899	4.205	5.151	5.673
DCP 3	.030	1.777	2.092	2.334	2.631	2.905	3.052	3.213	3.459	3.597	3.761	4.023
DCP 4	.049	1.573	1.757	1.996	2.259	2.440	2.683	2.859	3.072	3.219	3.361	3.436
DCP 5	.074	1.453	1.645	1.795	2.022	2.157	2.377	2.478	2.644	2.761	2.921	2.956
DCP 6	.099	1.410	1.561	1.775	1.869	2.016	2.205	2.271	2.393	2.523	2.620	2.675
DCP 7	.149	0.937	1.024	1.150	1.300	1.368	1.505	1.597	1.678	1.762	1.846	1.870
DCP 8	.200	0.870	0.976	1.071	1.168	1.213	1.336	1.372	1.485	1.495	1.594	1.649
DCP 9	.250	0.721	0.731	0.876	0.937	1.032	1.102	1.135	1.201	1.250	1.327	1.374
DCP10	.300	0.581	0.674	0.753	0.780	0.823	0.936	0.972	1.025	1.076	1.112	1.108
DCP11	.399	0.513	0.583	0.632	0.680	0.722	0.764	0.810	0.834	0.875	0.943	0.930
DCP12	.501	0.381	0.437	0.488	0.501	0.579	0.570	0.603	0.635	0.627	0.665	0.705
DCP13	.600	0.317	0.377	0.399	0.433	0.472	0.492	0.465	0.531	0.515	0.545	0.532
DCP14	.701	0.337	0.369	0.338	0.404	0.394	0.419	0.372	0.424	0.444	0.435	0.427
DCP15	.800	0.239	0.209	0.208	0.242	0.240	0.246	0.225	0.197	0.243	0.202	0.184
DCP16	.900	-0.083	-0.057	-0.062	-0.066	-0.054	-0.067	-0.055	-0.058	-0.096	-0.026	-0.035
DCP17	.969	-0.042	-0.088	-0.095	-0.037	-0.068	-0.097	-0.061	-0.073	-0.105	-0.065	-0.059

DATA TYPE	X/C											
ALPHA		8.891	9.426	9.917	10.446	10.957	11.511	12.008	12.543	13.067	13.598	14.061
CN		1.063	1.057	1.004	1.015	1.008	0.998	0.981	0.961	0.928	0.933	0.942
CM		0.018	0.018	-0.009	-0.014	-0.046	-0.052	-0.063	-0.062	-0.080	-0.076	-0.081
DCP 1	.010	6.352	6.097	4.955	4.974	4.414	4.241	2.244	2.144	2.018	2.053	2.075
DCP 2	.020	5.896	5.704	4.163	4.091	3.485	3.404	1.833	1.770	1.702	1.639	1.626
DCP 3	.030	4.530	4.723	3.867	3.999	3.714	3.598	1.862	1.812	1.745	1.816	1.732
DCP 4	.049	3.451	3.451	2.868	2.757	2.499	2.411	2.935	2.895	2.725	2.605	2.709
DCP 5	.074	3.009	2.930	2.429	2.290	2.010	1.952	2.560	2.501	2.614	2.576	2.612
DCP 6	.099	2.692	2.736	2.235	2.214	1.812	1.762	2.269	2.242	2.332	2.310	2.467
DCP 7	.149	1.972	2.013	1.765	1.859	1.568	1.572	1.422	1.439	1.409	1.493	1.587
DCP 8	.200	1.713	1.707	1.713	1.747	1.613	1.514	1.339	1.295	1.146	1.220	1.120
DCP 9	.250	1.373	1.371	1.440	1.465	1.411	1.374	1.168	1.141	1.051	1.013	1.023
DCP10	.300	1.162	1.117	1.248	1.310	1.259	1.172	1.031	1.040	0.974	0.977	0.926
DCP11	.399	0.952	0.939	1.050	1.068	1.202	1.265	1.034	1.009	0.908	0.937	0.915
DCP12	.501	0.709	0.707	0.811	0.878	0.864	0.962	0.918	0.869	0.796	0.805	0.810
DCP13	.600	0.572	0.548	0.634	0.625	0.733	0.668	0.838	0.750	0.762	0.768	0.800
DCP14	.701	0.429	0.388	0.421	0.361	0.479	0.502	0.723	0.717	0.736	0.660	0.705
DCP15	.800	0.230	0.232	0.237	0.316	0.306	0.375	0.565	0.558	0.597	0.598	0.615
DCP16	.900	-0.049	-0.005	0.050	0.078	0.107	0.150	0.183	0.244	0.189	0.193	0.233
DCP17	.969	-0.079	-0.060	-0.043	-0.012	0.010	0.001	0.019	0.034	0.004	0.002	0.000

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 2.3 x 10^6 SOLID FLOOR AND CEILING

DATA TYPE	X/C					
ALPHA		14.642	15.137	15.494	16.116	16.709
CN		0.981	0.958	0.987	0.978	0.983
CM		-0.086	-0.085	-0.094	-0.087	-0.091
DCP 1	.010	2.025	2.009	1.642	1.683	1.729
DCP 2	.020	1.722	1.662	1.702	1.704	1.770
DCP 3	.030	1.782	1.807	1.661	1.760	1.683
DCP 4	.049	2.647	2.476	2.427	2.652	2.466
DCP 5	.074	2.522	2.472	2.513	2.556	2.478
DCP 6	.099	2.615	2.575	2.612	2.649	2.542
DCP 7	.149	1.573	1.616	1.707	1.589	1.708
DCP 8	.200	1.286	1.164	1.244	1.162	1.156
DCP 9	.250	1.116	1.066	1.098	1.142	1.176
DCP10	.300	1.038	0.974	1.044	1.037	1.063
DCP11	.399	1.001	0.948	1.007	1.021	1.024
DCP12	.501	0.820	0.862	0.899	0.857	0.863
DCP13	.600	0.805	0.768	0.745	0.779	0.782
DCP14	.701	0.754	0.737	0.758	0.724	0.756
DCP15	.800	0.610	0.637	0.647	0.597	0.611
DCP16	.900	0.246	0.226	0.305	0.262	0.268
DCP17	.969	0.017	-0.005	0.049	0.060	0.059

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.399 Rn = 4.7 x 10^6 SOLID FLOOR AND CEILING

ALPHA		-9.581	-9.015	-8.378	-7.817	-7.257	-6.652	-6.015	-5.455	-4.836	-4.258	-3.598
CN		-0.628	-0.605	-0.598	-0.539	-0.495	-0.486	-0.444	-0.414	-0.356	-0.303	-0.238
CM		-0.013	-0.023	-0.037	-0.042	-0.039	-0.033	-0.036	-0.025	-0.025	-0.023	-0.021
DCP 1	.010	-3.087	-3.234	-3.125	-2.635	-3.142	-4.793	-4.578	-4.816	-4.414	-3.947	-3.305
DCP 2	.020	-2.479	-2.410	-2.714	-2.616	-3.244	-3.545	-3.312	-2.977	-2.616	-2.438	-2.135
DCP 3	.030	-2.148	-2.159	-2.213	-3.150	-3.157	-3.071	-2.578	-2.606	-2.099	-1.864	-1.603
DCP 4	.049	-1.734	-1.866	-2.257	-2.452	-2.325	-2.035	-1.923	-1.676	-1.482	-1.282	-1.114
DCP 5	.074	-1.652	-1.787	-2.039	-2.198	-1.874	-1.461	-1.389	-1.206	-1.042	-0.845	-0.682
DCP 6	.099	-1.455	-1.575	-1.815	-1.668	-1.411	-1.169	-1.085	-0.953	-0.840	-0.685	-0.524
DCP 7	.149	-1.317	-1.403	-1.501	-1.265	-1.032	-0.883	-0.791	-0.726	-0.602	-0.510	-0.403
DCP 8	.200	-1.227	-1.241	-1.313	-0.902	-0.731	-0.675	-0.674	-0.585	-0.517	-0.415	-0.307
DCP 9	.250	-1.141	-1.194	-0.980	-0.807	-0.640	-0.606	-0.541	-0.520	-0.441	-0.351	-0.273
DCP10	.300	-1.032	-0.877	-0.724	-0.578	-0.468	-0.480	-0.442	-0.400	-0.329	-0.292	-0.197
DCP11	.399	-0.663	-0.520	-0.487	-0.349	-0.351	-0.363	-0.319	-0.311	-0.230	-0.227	-0.155
DCP12	.501	-0.403	-0.371	-0.291	-0.294	-0.282	-0.287	-0.257	-0.233	-0.201	-0.167	-0.119
DCP13	.600	-0.255	-0.197	-0.116	-0.117	-0.138	-0.161	-0.124	-0.121	-0.103	-0.090	-0.052
DCP14	.701	-0.055	-0.036	0.003	0.048	0.003	0.001	-0.033	0.014	0.017	0.041	0.065
DCP15	.800	-0.015	-0.001	0.013	-0.005	0.022	-0.001	0.048	-0.016	0.004	0.015	0.020
DCP16	.900	-0.032	-0.035	-0.033	-0.037	-0.052	-0.072	-0.076	-0.066	-0.099	-0.081	-0.105
DCP17	.969	-0.054	-0.035	-0.033	-0.015	0.010	-0.008	0.010	-0.029	-0.036	-0.029	-0.035

ALPHA		-3.020	-2.418	-1.806	-1.164	-0.592	0.031	1.231	1.814	2.401	3.091	3.646
CN		-0.176	-0.116	-0.052	0.009	0.075	0.129	0.263	0.326	0.387	0.455	0.515
CM		-0.018	-0.019	-0.016	-0.014	-0.015	-0.012	-0.014	-0.012	-0.011	-0.011	-0.008
DCP 1	.010	-2.732	-2.253	-1.810	-1.315	-0.865	-0.446	0.329	0.727	1.086	1.455	1.927
DCP 2	.020	-1.821	-1.512	-1.177	-0.896	-0.574	-0.227	0.361	0.711	1.052	1.358	1.655
DCP 3	.030	-1.310	-1.094	-0.824	-0.563	-0.275	-0.059	0.512	0.764	1.043	1.338	1.600
DCP 4	.049	-0.875	-0.677	-0.468	-0.22	-0.036	0.165	0.650	0.873	1.093	1.314	1.580
DCP 5	.074	-0.520	-0.346	-0.169	0.01	0.183	0.345	0.718	0.890	1.085	1.276	1.447
DCP 6	.099	-0.362	-0.241	-0.072	0.078	0.235	0.348	0.697	0.816	0.975	1.139	1.324
DCP 7	.149	-0.282	-0.158	-0.050	0.068	0.186	0.298	0.514	0.660	0.756	0.855	0.977
DCP 8	.200	-0.246	-0.166	-0.044	0.048	0.133	0.253	0.426	0.504	0.617	0.731	0.814
DCP 9	.250	-0.184	-0.120	-0.020	0.054	0.126	0.215	0.349	0.466	0.535	0.624	0.697
DCP10	.300	-0.155	-0.071	-0.018	0.068	0.132	0.194	0.340	0.408	0.465	0.556	0.615
DCP11	.399	-0.072	-0.069	0.025	0.066	0.115	0.169	0.274	0.346	0.413	0.449	0.506
DCP12	.501	-0.080	-0.038	-0.003	0.033	0.095	0.117	0.222	0.264	0.295	0.351	0.377
DCP13	.600	-0.016	0.029	0.047	0.066	0.096	0.125	0.217	0.261	0.266	0.311	0.334
DCP14	.701	0.080	0.110	0.133	0.161	0.178	0.190	0.259	0.267	0.307	0.320	0.336
DCP15	.800	0.032	0.045	0.050	0.062	0.088	0.098	0.122	0.138	0.124	0.174	0.172
DCP16	.900	-0.109	-0.101	-0.113	-0.111	-0.084	-0.106	-0.086	-0.073	-0.072	-0.074	-0.043
DCP17	.969	-0.059	-0.034	-0.040	-0.053	-0.052	-0.061	-0.045	-0.082	-0.044	-0.065	-0.095

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.399 Rn = 4.7 x 10^6

SOLID FLOOR AND CEILING

ALPHA		4.233	4.892	5.471	6.C7C	6.652	7.302	7.847	8.45E	9.065	9.[illegible]	13.266
CN		0.582	3.650	0.700	0.756	0.823	C.879	3.937	0.984	1.039	1.[illegible]	1.075
CM		-0.CC6	-0.008	-3.006	-0.001	-0.003	-0.C01	0.002	3.005	0.005	3.015	0.C20
DCP 1	.010	2.357	2.718	3.106	3.528	3.934	4.378	5.C55	5.645	6.071	6.322	6.346
DCP 2	.020	3.053	2.362	2.639	2.998	3.152	3.496	3.719	3.837	4.263	5.098	5.585
DCP 3	.030	1.908	2.19C	2.445	2.696	2.937	3.239	3.482	3.696	3.843	4.001	4.336
DCP 4	.049	1.821	2.023	2.226	2.501	2.726	2.910	3.163	3.362	3.473	3.566	3.652
DCP 5	.074	1.646	1.847	2.009	2.195	2.393	2.557	2.701	2.858	3.024	3.080	3.122
DCP 6	.399	1.454	1.626	1.754	1.911	2.052	2.206	2.356	2.457	2.585	2.657	2.688
DCP 7	.149	1.126	1.250	1.330	1.479	1.584	1.67C	1.774	1.89C	1.982	2.027	2.110
DCP 8	.200	3.904	1.004	1.138	1.156	1.279	1.364	1.44C	1.52E	1.6C8	1.623	1.656
DCP 9	.250	0.775	0.832	0.930	1.012	1.C8C	1.153	1.245	1.30C	1.381	1.407	1.441
DCP10	.300	0.683	3.753	0.811	0.868	3.929	0.995	1.054	1.115	1.166	1.183	1.201
DCP11	.399	3.591	0.631	3.645	0.705	0.764	3.812	0.87E	0.877	0.943	0.971	3.965
DCP12	.501	0.435	3.468	0.482	0.543	0.592	0.623	3.637	0.70C	0.753	0.706	0.734
DCP13	.600	0.355	3.430	3.446	0.426	0.502	0.516	0.562	3.554	0.560	0.566	0.561
DCP14	.701	0.340	0.389	3.391	3.414	0.439	0.466	0.466	0.464	3.483	0.445	0.419
DCP15	.800	0.19C	3.210	0.204	3.203	3.220	0.220	3.216	0.235	0.249	3.213	0.185
DCP16	.900	-3.C65	-0.055	-3.019	-0.C5S	-3.046	-3.037	-0.036	-0.023	-0.026	-3.036	-3.032
DCP17	.969	-0.074	-0.C75	-0.C70	-3.062	-0.C6E	-0.066	-0.065	-0.C8C	-3.067	-0.075	-0.059

ALPHA		10.855	11.524	12.C44	12.631	13.22E	13.881	14.427	15.10E	15.651	16.915	17.468
CN		1.074	1.037	1.057	1.054	1.038	1.C56	1.029	1.012	1.052	1.101	1.C99
CM		0.024	3.C09	-0.C08	-3.024	-0.040	-3.053	-0.C45	-3.055	-0.061	-0.C85	-0.C87
DCP 1	.010	6.130	3.573	3.217	2.812	2.724	2.448	2.525	2.573	2.6C7	4.127	4.384
DCP 2	.020	5.637	3.939	3.254	2.88C	2.76C	2.416	2.502	2.605	2.697	3.222	2.911
DCP 3	.030	4.734	4.087	3.627	3.333	3.C57	2.825	3.029	3.12E	3.10E	2.132	1.711
DCP 4	.049	3.754	3.793	3.708	3.455	3.14C	3.094	2.854	2.613	2.711	2.644	2.559
DCP 5	.074	3.126	3.114	3.042	2.92C	2.710	2.641	2.515	2.295	2.444	2.476	2.534
DCP 6	.099	2.635	2.657	2.623	2.491	2.28C	2.382	2.25E	2.11C	2.346	2.165	2.331
DCP 7	.149	2.087	2.C4E	1.992	1.924	1.831	1.793	1.843	1.722	1.915	1.864	1.933
DCP 8	.200	1.703	1.736	1.767	1.664	1.618	1.534	1.561	1.566	1.571	1.564	1.632
DCP 9	.250	1.471	1.551	1.530	1.595	1.575	1.606	1.543	1.564	1.466	1.391	1.319
DCP10	.300	1.217	1.258	1.473	1.42E	1.427	1.383	1.37E	1.363	1.344	1.245	1.167
DCP11	.399	0.976	3.952	1.064	1.13E	1.122	1.164	1.107	1.C95	1.116	1.172	1.127
DCP12	.501	0.70E	0.712	0.745	0.791	0.852	1.CC6	0.903	3.868	0.881	1.022	0.952
DCP13	.600	3.503	3.498	0.582	3.663	3.595	0.726	0.684	3.708	3.719	0.871	3.880
DCP14	.701	0.389	0.376	3.402	0.473	3.533	0.539	0.555	0.545	3.586	3.747	0.782
DCP15	.800	3.192	0.190	3.243	0.28[illegible]	3.755	3.365	0.346	3.365	0.435	0.570	3.584
DCP16	.900	-0.021	3.036	0.033	0.04[illegible]	0.120	3.140	3.14C	0.163	3.239	0.235	3.246
DCP17	.969	-0.064	-0.023	3.016	-0.032	3.C04	0.011	3.014	0.04C	0.065	3.035	0.053

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.399 Rn = 4.7 x 10^6 SOLID FLOOR AND CEILING

ALPHA		18.344	16.647	19.315	19.863	
CN		1.075	1.058	1.045	1.032	
CM		-0.087	-0.087	-0.088	-0.092	
DCP 1	.010	4.227	3.834	3.645	3.215	
DCP 2	.020	2.942	2.906	2.776	2.679	
DCP 3	.030	1.660	1.682	1.706	1.695	
DCP 4	.049	2.470	2.606	2.445	2.281	
DCP 5	.074	2.442	2.349	2.208	2.244	
DCP 6	.099	2.193	2.172	2.160	2.128	
DCP 7	.149	2.057	1.967	1.581	1.923	
DCP 8	.200	1.686	1.693	1.617	1.555	
DCP 9	.250	1.243	1.253	1.237	1.265	
DCP10	.300	1.108	1.106	1.137	1.082	
DCP11	.399	1.032	1.011	1.024	1.059	
DCP12	.501	0.942	0.917	0.917	0.904	
DCP13	.600	0.832	0.806	0.824	0.831	
DCP14	.701	0.802	0.773	0.747	0.761	
DCP15	.800	0.657	0.608	0.597	0.589	
DCP16	.900	0.214	0.274	0.269	0.294	
DCP17	.969	0.054	0.070	0.079	0.060	

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 6.3 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-9.588	-9.002	-8.486	-7.861	-7.241	-6.700	-6.094	-5.440	-4.878	-4.290	-3.669
CN		-0.684	-0.661	-0.615	-0.547	-0.526	-0.500	-0.470	-0.435	-0.384	-0.323	-0.268
CM		-0.018	-0.025	-0.036	-0.039	-0.038	-0.036	-0.034	-0.028	-0.025	-0.023	-0.019
DCP 1	.010	-2.006	-2.162	-2.247	-2.696	-4.038	-4.916	-5.153	-5.191	-4.784	-4.165	-3.545
DCP 2	.020	-1.886	-2.089	-2.130	-2.848	-3.475	-3.712	-3.447	-3.041	-2.844	-2.583	-2.305
DCP 3	.030	-3.220	-3.244	-3.190	-3.338	-3.243	-3.200	-3.071	-2.613	-2.148	-1.924	-1.685
DCP 4	.049	-2.200	-2.222	-2.538	-2.510	-2.325	-2.050	-1.912	-1.746	-1.545	-1.352	-1.162
DCP 5	.074	-1.947	-1.973	-2.276	-2.072	-1.715	-1.515	-1.311	-1.242	-1.100	-0.918	-0.739
DCP 6	.099	-1.807	-1.857	-1.875	-1.578	-1.355	-1.179	-1.100	-0.962	-0.824	-0.705	-0.559
DCP 7	.149	-1.589	-1.584	-1.356	-1.128	-1.092	-0.911	-0.840	-0.753	-0.691	-0.547	-0.437
DCP 8	.200	-1.169	-1.142	-1.025	-0.944	-0.796	-0.779	-0.707	-0.631	-0.586	-0.466	-0.374
DCP 9	.250	-1.193	-1.214	-1.100	-0.815	-0.742	-0.637	-0.582	-0.521	-0.464	-0.374	-0.303
DCP10	.300	-1.030	-0.990	-0.923	-0.617	-0.538	-0.499	-0.456	-0.434	-0.358	-0.311	-0.243
DCP11	.399	-0.760	-0.650	-0.499	-0.414	-0.371	-0.359	-0.361	-0.332	-0.292	-0.231	-0.199
DCP12	.501	-0.475	-0.347	-0.316	-0.292	-0.311	-0.297	-0.279	-0.255	-0.210	-0.186	-0.147
DCP13	.600	-0.236	-0.196	-0.143	-0.145	-0.137	-0.149	-0.130	-0.130	-0.103	-0.079	-0.057
DCP14	.701	-0.035	-0.059	0.010	0.013	0.005	-0.009	0.020	0.006	0.024	0.038	0.054
DCP15	.800	-0.038	0.006	0.002	0.023	0.002	0.008	0.001	0.012	-0.017	-0.030	0.012
DCP16	.900	-0.023	-0.075	-0.049	-0.046	-0.064	-0.053	-0.072	-0.114	-0.109	-0.105	-0.123
DCP17	.969	-0.016	0.002	0.016	-0.002	0.004	-0.008	-0.022	-0.030	-0.019	-0.019	-0.040

ALPHA		-3.046	-2.492	-1.882	-1.198	-0.666	-0.065	0.583	1.181	1.767	2.388	2.998
CN		-0.203	-0.142	-0.073	-0.011	0.052	0.115	0.186	0.250	0.316	0.371	0.437
CM		-0.018	-0.016	-0.016	-0.018	-0.014	-0.013	-0.016	-0.014	-0.013	-0.010	-0.010
DCP 1	.010	-2.928	-2.411	-1.930	-1.483	-0.998	-0.575	-0.186	0.229	0.641	1.018	1.432
DCP 2	.020	-2.010	-1.679	-1.330	-1.021	-0.693	-0.347	-0.032	0.264	0.639	0.946	1.255
DCP 3	.030	-1.428	-1.167	-0.890	-0.630	-0.362	-0.115	0.181	0.467	0.720	1.012	1.271
DCP 4	.049	-0.921	-0.713	-0.515	-0.309	-0.055	0.158	0.356	0.584	0.839	1.023	1.290
DCP 5	.074	-0.575	-0.403	-0.215	-0.035	0.135	0.322	0.512	0.701	0.869	1.053	1.234
DCP 6	.099	-0.401	-0.248	-0.094	0.047	0.206	0.336	0.508	0.692	0.805	0.981	1.142
DCP 7	.149	-0.325	-0.204	-0.077	0.010	0.146	0.258	0.375	0.481	0.631	0.727	0.830
DCP 8	.200	-0.285	-0.192	-0.089	-0.028	0.089	0.194	0.276	0.371	0.479	0.553	0.679
DCP 9	.250	-0.219	-0.155	-0.063	-0.011	0.091	0.170	0.249	0.351	0.433	0.497	0.574
DCP10	.300	-0.165	-0.098	-0.043	0.058	0.106	0.176	0.251	0.333	0.399	0.481	0.542
DCP11	.399	-0.134	-0.072	0.004	0.040	0.084	0.146	0.222	0.272	0.344	0.394	0.425
DCP12	.501	-0.105	-0.095	-0.015	0.026	0.067	0.126	0.165	0.193	0.245	0.273	0.341
DCP13	.600	-0.023	0.006	0.031	0.071	0.095	0.144	0.168	0.218	0.250	0.274	0.292
DCP14	.701	0.091	0.104	0.136	0.152	0.172	0.194	0.244	0.245	0.268	0.290	0.318
DCP15	.800	0.016	0.033	0.037	0.068	0.077	0.089	0.112	0.131	0.144	0.129	0.145
DCP16	.900	-0.137	-0.118	-0.115	-0.092	-0.098	-0.120	-0.090	-0.082	-0.083	-0.088	-0.071
DCP17	.969	-0.036	-0.032	-0.041	-0.029	-0.045	-0.037	-0.044	-0.047	-0.068	-0.060	-0.050

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 6.3 x 10^6

SOLID FLOOR AND CEILING

ALPHA		3.583	4.166	4.834	5.368	6.013	6.590	7.225	7.812	8.398	9.020	9.601
CN		0.500	0.576	0.643	0.694	0.763	0.831	0.887	0.944	1.000	1.033	1.063
CM		-0.008	-0.010	-0.010	-0.007	-0.006	-0.005	-0.001	0.000	0.002	0.006	0.011
DCP 1	.010	1.846	2.262	2.668	3.063	3.470	3.912	4.492	5.103	5.780	6.216	6.439
DCP 2	.020	1.593	1.958	2.260	2.566	2.915	3.277	3.568	3.871	4.001	4.106	4.817
DCP 3	.030	1.573	1.864	2.158	2.422	2.672	2.986	3.283	3.510	3.736	3.909	4.014
DCP 4	.049	1.538	1.759	2.013	2.231	2.493	2.727	2.951	3.172	3.359	3.501	3.600
DCP 5	.074	1.411	1.614	1.813	1.959	2.180	2.378	2.549	2.707	2.881	3.000	3.056
DCP 6	.099	1.309	1.446	1.632	1.757	1.911	2.087	2.225	2.345	2.518	2.591	2.667
DCP 7	.149	0.965	1.089	1.224	1.295	1.449	1.578	1.677	1.787	1.863	1.947	2.030
DCP 8	.200	0.760	0.868	0.963	1.063	1.152	1.265	1.350	1.407	1.526	1.574	1.617
DCP 9	.250	0.665	0.778	0.841	0.913	0.999	1.076	1.163	1.218	1.292	1.365	1.418
DCP10	.300	0.596	0.670	0.752	0.800	0.890	0.944	1.024	1.078	1.120	1.179	1.199
DCP11	.399	0.504	0.565	0.597	0.639	0.718	0.776	0.811	0.874	0.907	0.938	0.955
DCP12	.50	0.346	0.446	0.483	0.516	0.556	0.602	0.623	0.645	0.709	0.701	0.731
DCP13	.600	0.236	0.364	0.[illegible]	0.[illegible]	0.[illegible]	0.490	0.528	0.556	0.556	0.574	0.595
DCP14	.701	0.[illegible]	0.[illegible]	0.366	0.[illegible]	0.[illegible]	0.451	0.460	0.[illegible]	0.498	0.487	0.479
DCP15	.800	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.229	0.250	0.[illegible]	0.262	0.246	0.236
DCP16	.900	-0.[illegible]	-0.[illegible]	-0.[illegible]	0.[illegible]	-0.[illegible]	-0.022	-0.064	-0.[illegible]	-0.[illegible]	-0.010	-0.058
DCP17	.969	-0.[illegible]	0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-0.077	-0.069

ALPHA		10.191	10.837	11.408	11.997	12.602	13.271	13.778	14.417	15.046	15.563	16.154
CN		1.091	1.092	1.081	1.075	1.035	1.020	1.012	1.037	1.035	1.023	1.040
CM		0.016	0.023	0.026	0.022	0.014	-0.009	-0.028	-0.036	-0.049	-0.055	-0.061
DCP 1	.010	6.498	6.339	6.184	5.952	5.646	4.741	4.863	4.670	4.655	4.120	4.211
DCP 2	.020	5.512	5.713	5.570	5.280	4.588	4.469	4.126	4.044	4.097	3.452	3.597
DCP 3	.030	4.338	4.788	4.996	4.962	4.715	4.235	3.943	3.660	3.357	3.128	3.228
DCP 4	.049	3.669	3.840	3.963	3.958	3.674	3.677	3.230	3.361	3.148	3.095	2.920
DCP 5	.074	3.139	3.140	3.146	3.125	2.950	2.795	2.487	2.527	2.521	2.383	2.211
DCP 6	.099	2.740	2.737	2.741	2.695	2.592	2.334	2.079	2.178	2.107	2.126	2.037
DCP 7	.149	2.073	2.108	2.082	2.105	1.956	1.775	1.698	1.736	1.704	1.714	1.717
DCP 8	.200	1.673	1.695	1.683	1.721	1.619	1.521	1.460	1.534	1.442	1.452	1.487
DCP 9	.250	1.424	1.430	1.415	1.386	1.318	1.309	1.328	1.382	1.257	1.276	1.396
DCP10	.300	1.263	1.248	1.215	1.213	1.234	1.185	1.222	1.199	1.154	1.141	1.192
DCP11	.399	0.987	0.982	0.951	0.953	0.914	0.936	1.015	0.977	1.015	1.026	1.011
DCP12	.501	0.738	0.720	0.711	0.685	0.658	0.731	0.738	0.797	0.791	0.843	0.906
DCP13	.600	0.575	0.545	0.525	0.495	0.479	0.557	0.626	0.660	0.765	0.732	0.760
DCP14	.701	0.440	0.426	0.355	0.354	0.370	0.476	0.495	0.543	0.607	0.585	0.628
DCP15	.800	0.214	0.195	0.198	0.191	0.247	0.287	0.344	0.376	0.442	0.472	0.519
DCP16	.900	-0.022	-0.053	-0.022	0.042	0.047	0.093	0.166	0.172	0.176	0.190	0.161
DCP17	.969	-0.046	-0.057	-0.037	-0.019	-0.023	0.007	0.017	0.070	0.055	0.055	0.043

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.400 Rn = 6.3 x 10^6 SOLID FLOOR AND CEILING

ALPHA		16.758	17.395	17.968	18.578	19.211	19.757
CN		1.022	1.033	1.007	0.974	1.018	1.003
CM		-0.065	-0.075	-0.070	-0.081	-0.095	-0.092
DCP 1	.010	3.689	3.702	3.516	3.499	3.505	3.523
DCP 2	.020	3.414	3.309	3.258	3.080	2.971	2.816
DCP 3	.030	3.055	2.632	2.865	2.770	2.470	2.225
DCP 4	.049	2.637	2.512	2.395	2.096	2.059	2.140
DCP 5	.074	2.120	2.225	1.970	1.750	1.815	1.849
DCP 6	.099	2.018	1.961	1.860	1.638	1.714	1.793
DCP 7	.149	1.664	1.668	1.764	1.499	1.564	1.628
DCP 8	.200	1.489	1.506	1.448	1.349	1.449	1.477
DCP 9	.250	1.372	1.394	1.384	1.322	1.306	1.311
DCP10	.300	1.224	1.234	1.242	1.183	1.247	1.145
DCP11	.399	1.077	1.101	1.050	1.100	1.150	1.054
DCP12	.501	0.902	0.928	0.872	0.931	0.980	0.928
DCP13	.600	0.704	0.747	0.784	0.780	0.868	0.857
DCP14	.701	0.639	0.650	0.634	0.626	0.711	0.748
DCP15	.800	0.477	0.504	0.470	0.517	0.553	0.569
DCP16	.900	0.203	0.248	0.216	0.226	0.257	0.231
DCP17	.969	0.064	0.082	0.045	0.068	0.076	0.072

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

SOLID FLOOR AND CEILING

M = 0.401 Rn = 7.0 x 10^6

ALPHA		-9.448	-8.826	-8.289	-7.706	-7.127	-6.434	-5.927	-5.336	-4.725	-4.092	-3.543
CN		-0.665	-0.626	-0.579	-0.529	-0.499	-0.496	-0.461	-0.409	-0.363	-0.308	-0.248
CM		-0.021	-0.031	-0.038	-0.039	-0.036	-0.035	-0.029	-0.028	-0.024	-0.020	-0.019
DCP 1	.010	-2.061	-2.199	-2.391	-2.658	-4.161	-5.116	-5.086	-5.077	-4.577	-3.946	-3.320
DCP 2	.020	-1.987	-2.122	-2.438	-3.244	-3.580	-3.656	-3.316	-2.935	-2.777	-2.533	-2.221
DCP 3	.030	-3.147	-3.208	-3.351	-3.198	-3.204	-3.126	-2.858	-2.281	-2.073	-1.838	-1.602
DCP 4	.049	-2.163	-2.415	-2.581	-2.476	-2.234	-2.012	-1.828	-1.671	-1.521	-1.320	-1.090
DCP 5	.074	-1.953	-2.006	-2.212	-2.075	-1.536	-1.447	-1.317	-1.184	-1.017	-0.840	-0.696
DCP 6	.099	-1.820	-1.910	-1.701	-1.476	-1.213	-1.132	-1.020	-0.912	-0.768	-0.629	-0.497
DCP 7	.149	-1.601	-1.468	-1.218	-1.108	-0.953	-0.929	-0.827	-0.721	-0.637	-0.519	-0.420
DCP 8	.200	-1.118	-1.046	-0.995	-0.821	-0.746	-0.746	-0.668	-0.605	-0.510	-0.426	-0.352
DCP 9	.250	-1.205	-1.121	-0.967	-0.798	-0.666	-0.590	-0.563	-0.503	-0.459	-0.357	-0.283
DCP10	.300	-1.015	-0.858	-0.718	-0.469	-0.536	-0.486	-0.447	-0.389	-0.333	-0.289	-0.212
DCP11	.399	-0.660	-0.563	-0.408	-0.393	-0.360	-0.377	-0.346	-0.302	-0.256	-0.226	-0.168
DCP12	.501	-0.421	-0.362	-0.348	-0.303	-0.264	-0.295	-0.270	-0.232	-0.204	-0.167	-0.150
DCP13	.600	-0.237	-0.154	-0.144	-0.159	-0.184	-0.162	-0.139	-0.123	-0.119	-0.090	-0.068
DCP14	.701	-0.029	-0.024	-0.014	0.011	0.016	0.007	-0.018	0.022	0.025	0.039	0.084
DCP15	.800	-0.023	0.018	0.016	0.011	0.010	-0.008	-0.023	-0.030	-0.018	-0.011	0.009
DCP16	.900	-0.035	-0.048	-0.021	-0.025	-0.061	-0.053	-0.084	-0.076	-0.092	-0.094	-0.108
DCP17	.969	-0.017	-0.030	-0.011	-0.025	0.008	-0.020	-0.013	-0.011	-0.029	-0.048	-0.042

ALPHA		-2.942	-2.305	-1.659	-1.101	-0.495	0.144	0.741	1.312	1.918	2.562	3.151
CN		-0.183	-0.120	-0.059	0.009	0.073	0.137	0.194	0.259	0.324	0.392	0.452
CM		-0.019	-0.017	-0.015	-0.018	-0.016	-0.016	-0.014	-0.014	-0.013	-0.012	-0.010
DCP 1	.010	-2.739	-2.213	-1.740	-1.311	-0.881	-0.479	-0.066	0.355	0.740	1.118	1.535
DCP 2	.020	-1.924	-1.580	-1.277	-0.924	-0.609	-0.296	0.011	0.342	0.654	0.988	1.294
DCP 3	.030	-1.356	-1.071	-0.802	-0.545	-0.302	-0.021	0.247	0.517	0.776	1.099	1.358
DCP 4	.049	-0.895	-0.701	-0.461	-0.233	-0.014	0.178	0.400	0.628	0.859	1.070	1.332
DCP 5	.074	-0.517	-0.351	-0.155	0.003	0.189	0.373	0.543	0.710	0.900	1.111	1.261
DCP 6	.099	-0.359	-0.213	-0.052	0.095	0.235	0.406	0.547	0.698	0.845	1.030	1.188
DCP 7	.149	-0.292	-0.183	-0.060	0.036	0.153	0.272	0.370	0.496	0.607	0.737	0.848
DCP 8	.200	-0.266	-0.141	-0.081	0.034	0.151	0.230	0.318	0.391	0.512	0.613	0.679
DCP 9	.250	-0.216	-0.138	-0.041	0.016	0.103	0.191	0.263	0.344	0.444	0.518	0.616
DCP10	.300	-0.134	-0.067	-0.002	0.059	0.152	0.199	0.260	0.337	0.412	0.500	0.545
DCP11	.399	-0.115	-0.071	-0.013	0.059	0.119	0.182	0.232	0.293	0.341	0.381	0.452
DCP12	.501	-0.097	-0.045	-0.004	0.034	0.072	0.118	0.157	0.203	0.247	0.309	0.342
DCP13	.600	-0.023	0.033	0.023	0.084	0.100	0.144	0.182	0.206	0.229	0.267	0.301
DCP14	.701	0.098	0.110	0.137	0.153	0.188	0.210	0.213	0.249	0.277	0.305	0.327
DCP15	.800	0.022	0.029	0.042	0.071	0.084	0.098	0.104	0.132	0.139	0.158	0.159
DCP16	.900	-0.106	-0.111	-0.104	-0.072	-0.080	-0.068	-0.069	-0.064	-0.058	-0.069	-0.062
DCP17	.969	-0.027	-0.047	-0.037	-0.035	-0.047	-0.046	-0.055	-0.067	-0.056	-0.058	-0.066

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

SOLID FLOOR AND CEILING

M = 0.401 Rn = 7.0 x 10^6

ALPHA		3.724	4.365	4.573	5.566	6.117	6.789	7.400	7.963	8.562	9.191	9.747
CN		0.524	0.578	0.643	0.701	0.761	0.829	0.878	0.941	0.994	1.036	1.056
CM		-0.013	-0.009	-0.009	-0.007	-0.004	-0.005	0.000	0.000	0.004	0.006	0.011
DCP 1	.010	1.952	2.308	2.721	3.091	3.512	3.966	4.475	5.232	5.880	6.311	6.454
DCP 2	.020	1.663	1.972	2.274	2.580	2.890	3.296	3.551	3.870	3.983	4.128	4.752
DCP 3	.030	1.629	1.903	2.216	2.408	2.684	3.004	3.261	3.524	3.733	3.925	4.012
DCP 4	.049	1.567	1.795	2.018	2.244	2.476	2.717	2.942	3.156	3.348	3.498	3.554
DCP 5	.074	1.454	1.622	1.820	1.994	2.193	2.383	2.541	2.692	2.875	2.999	3.050
DCP 6	.099	1.339	1.479	1.634	1.786	1.939	2.102	2.239	2.371	2.488	2.608	2.690
DCP 7	.149	0.566	1.089	1.205	1.311	1.439	1.537	1.632	1.764	1.866	1.938	1.977
DCP 8	.200	0.791	0.894	0.975	1.059	1.157	1.243	1.342	1.404	1.505	1.595	1.619
DCP 9	.250	0.696	0.757	0.846	0.918	0.993	1.098	1.135	1.223	1.296	1.362	1.391
DCP10	.300	0.637	0.684	0.748	0.817	0.881	0.940	1.011	1.065	1.114	1.157	1.198
DCP11	.399	0.497	0.545	0.611	0.671	0.712	0.757	0.804	0.852	0.912	0.938	0.974
DCP12	.501	0.383	0.408	0.461	0.510	0.546	0.599	0.613	0.643	0.685	0.721	0.703
DCP13	.600	0.361	0.389	0.404	0.433	0.451	0.492	0.528	0.541	0.568	0.570	0.571
DCP14	.701	0.354	0.356	0.395	0.408	0.419	0.448	0.431	0.467	0.484	0.483	0.468
DCP15	.800	0.189	0.207	0.208	0.211	0.234	0.245	0.245	0.262	0.256	0.249	0.258
DCP16	.900	-0.037	-0.046	-0.036	-0.052	-0.056	-0.033	-0.041	-0.015	-0.038	-0.006	-0.046
DCP17	.969	-0.058	-0.076	-0.075	-0.061	-0.074	-0.055	-0.073	-0.068	-0.065	-0.078	-0.078

ALPHA		10.391	10.598	11.622	12.183	12.724	13.441	13.994	14.575	15.174	15.840	16.344
CN		1.067	1.079	1.066	1.030	1.016	0.962	0.977	1.028	0.999	0.958	0.964
CM		0.018	0.021	0.023	0.027	0.010	-0.025	-0.030	-0.049	-0.048	-0.056	-0.056
DCP 1	.010	6.473	6.236	6.036	5.834	5.255	4.840	5.040	4.945	4.672	4.211	4.411
DCP 2	.020	5.358	5.585	5.542	5.392	4.983	4.072	4.180	3.858	3.972	3.621	3.674
DCP 3	.030	4.256	4.688	4.935	4.917	4.653	4.066	3.832	3.242	3.331	3.379	3.307
DCP 4	.049	3.615	3.773	3.878	3.855	3.644	3.017	3.126	3.187	2.819	2.296	2.409
DCP 5	.074	3.103	3.110	3.084	3.031	2.883	2.381	2.421	2.655	2.287	1.981	1.917
DCP 6	.099	2.690	2.703	2.643	2.579	2.459	1.927	1.995	2.142	1.979	1.732	1.758
DCP 7	.149	2.033	2.055	2.011	1.987	1.906	1.522	1.547	1.654	1.637	1.458	1.521
DCP 8	.200	1.653	1.672	1.651	1.622	1.592	1.345	1.405	1.337	1.411	1.428	1.373
DCP 9	.250	1.434	1.421	1.401	1.352	1.328	1.274	1.245	1.219	1.321	1.282	1.271
DCP10	.300	1.198	1.232	1.190	1.195	1.154	1.165	1.077	1.137	1.098	1.149	1.175
DCP11	.399	0.966	0.952	0.974	0.886	0.901	0.927	0.951	1.017	0.992	0.992	1.026
DCP12	.501	0.726	0.737	0.706	0.643	0.656	0.768	0.731	0.823	0.787	0.835	0.820
DCP13	.600	0.557	0.543	0.519	0.475	0.472	0.572	0.622	0.695	0.686	0.670	0.655
DCP14	.701	0.431	0.420	0.382	0.319	0.373	0.494	0.532	0.580	0.585	0.626	0.567
DCP15	.800	0.207	0.196	0.183	0.182	0.255	0.334	0.337	0.472	0.455	0.410	0.439
DCP16	.900	-0.041	-0.030	0.001	0.007	0.074	0.140	0.159	0.207	0.162	0.179	0.191
DCP17	.969	-0.070	-0.075	-0.065	-0.030	-0.008	-0.021	0.034	0.047	0.045	0.022	0.049

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.401 Rn = 7.0 x 10^6 SOLID FLOOR AND CEILING

ALPHA		17.010	17.585	18.177	18.756	19.325
CN		0.985	0.980	0.962	0.977	0.931
CM		-0.062	-0.069	-0.074	-0.083	-0.083
DCP 1	.010	3.988	3.699	3.447	3.268	3.121
DCP 2	.020	3.429	3.115	2.997	2.871	2.696
DCP 3	.030	3.099	2.751	2.784	2.468	2.582
DCP 4	.049	2.403	2.488	2.157	2.236	1.842
DCP 5	.074	1.997	2.076	1.916	1.846	1.657
DCP 6	.099	1.910	1.897	1.711	1.825	1.576
DCP 7	.149	1.544	1.530	1.509	1.502	1.421
DCP 8	.200	1.395	1.378	1.405	1.363	1.304
DCP 9	.250	1.382	1.280	1.307	1.242	1.223
DCP10	.300	1.160	1.149	1.201	1.149	1.177
DCP11	.399	1.067	1.046	1.028	1.120	1.047
DCP12	.501	0.859	0.856	0.866	0.912	0.915
DCP13	.600	0.680	0.753	0.701	0.805	0.774
DCP14	.701	0.579	0.633	0.608	0.665	0.636
DCP15	.800	0.464	0.469	0.506	0.510	0.484
DCP16	.900	0.233	0.223	0.227	0.218	0.217
DCP17	.969	0.039	0.048	0.086	0.072	0.064

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.500 Rn = 7.9 x 10^6 SOLID FLOOR AND CEILING

ALPHA		-5.529	-9.C01	-6.421	-7.811	-7.252	-6.656	-6.024	-5.435	-4.858	-4.274	-3.558
CN		-0.676	-0.648	-0.616	-0.569	-0.526	-0.491	-0.442	-0.409	-0.368	-0.318	-0.259
CM		-0.C08	-0.022	-0.C36	-0.042	-0.044	-0.042	-0.039	-0.032	-0.029	-0.024	-0.021
DCP 1	.010	-2.275	-2.391	-2.886	-2.937	-3.432	-3.882	-3.81C	-3.797	-3.521	-3.855	-3.773
DCP 2	.020	-2.15C	-2.382	-2.626	-3.191	-3.334	-3.437	-3.27C	-2.970	-2.939	-2.757	-2.171
DCP 3	.030	-2.668	-2.896	-3.C88	-3.119	-3.107	-3.C38	-2.809	-2.622	-2.59C	-2.057	-1.700
DCP 4	.049	-2.104	-2.219	-2.417	-2.480	-2.476	-2.425	-2.288	-2.110	-1.850	-1.295	-1.131
DCP 5	.074	-1.834	-1.913	-2.161	-2.106	-1.905	-1.766	-1.555	-1.399	-1.134	-0.875	-0.732
DCP 6	.099	-1.800	-1.85C	-1.729	-1.725	-1.557	-1.377	-1.122	-0.939	-0.842	-0.711	-0.551
DCP 7	.149	-1.494	-1.489	-1.437	-1.267	-1.152	-0.940	-0.798	-0.724	-0.612	-0.526	-0.436
DCP 8	.200	-1.137	-1.127	-1.301	-0.944	-0.853	-0.737	-0.695	-0.609	-0.544	-0.457	-0.368
DCP 9	.250	-1.123	-1.176	-1.006	-0.899	-0.742	-0.654	-0.556	-0.517	-0.441	-0.385	-0.308
DCP10	.300	-0.952	-0.862	-0.688	-0.656	-0.546	-0.475	-0.433	-0.383	-0.343	-0.298	-0.208
DCP11	.399	-0.727	-0.591	-0.478	-0.429	-0.349	-0.346	-0.303	-0.279	-0.262	-0.216	-0.154
DCP12	.501	-0.455	-0.426	-0.339	-0.292	-0.274	-0.262	-0.236	-0.221	-0.195	-0.189	-0.143
DCP13	.600	-0.339	-0.192	-0.172	-0.144	-0.144	-0.138	-0.110	-0.127	-0.108	-0.077	-0.056
DCP14	.701	-0.090	-0.063	0.009	0.029	0.036	0.015	0.029	0.041	0.041	0.032	0.069
DCP15	.800	-0.056	-0.056	-0.013	0.016	0.015	0.041	0.013	0.010	0.012	0.004	0.009
DCP16	.900	-0.077	-0.041	-0.051	-0.019	-0.035	-0.044	-0.033	-0.075	-0.082	-0.081	-0.122
DCP17	.969	-0.000	-0.010	-0.002	-0.026	0.015	0.006	-0.005	-0.018	-0.017	-0.033	-0.024

ALPHA		-3.047	-2.452	-1.851	-1.162	-0.620	0.010	0.680	1.186	1.801	2.458	3.015
CN		-0.198	-0.137	-0.070	-0.007	0.059	0.128	0.196	0.262	0.327	0.401	0.472
CM		-0.021	-0.017	-0.017	-0.016	-0.016	-0.016	-0.015	-0.013	-0.010	-0.012	-0.010
DCP 1	.010	-3.198	-2.551	-1.966	-1.538	-1.072	-0.680	-0.276	0.162	0.605	0.817	1.397
DCP 2	.020	-2.014	-1.686	-1.371	-1.050	-0.709	-0.363	-0.044	0.333	0.665	0.991	1.322
DCP 3	.030	-1.463	-1.217	-0.943	-0.673	-0.425	-0.138	0.165	0.451	0.738	1.053	1.346
DCP 4	.049	-0.922	-0.656	-0.485	-0.265	-0.032	0.175	0.419	0.663	0.911	1.159	1.430
DCP 5	.074	-0.552	-0.369	-0.186	-0.015	0.164	0.385	0.576	0.757	0.956	1.172	1.377
DCP 6	.099	-0.415	-0.263	-0.095	0.048	0.208	0.359	0.552	0.715	0.882	1.061	1.248
DCP 7	.149	-0.328	-0.187	-0.071	0.033	0.162	0.284	0.402	0.543	0.648	0.756	0.897
DCP 8	.200	-0.277	-0.194	-0.088	-0.001	0.114	0.234	0.303	0.400	0.514	0.626	0.732
DCP 9	.250	-0.227	-0.140	-0.052	0.017	0.101	0.200	0.291	0.371	0.461	0.554	0.632
DCP10	.300	-0.142	-0.076	-0.034	0.061	0.121	0.203	0.259	0.351	0.424	0.510	0.578
DCP11	.399	-0.121	-0.054	-0.004	0.063	0.118	0.184	0.235	0.294	0.354	0.428	0.488
DCP12	.501	-0.081	-0.060	-0.007	0.031	0.071	0.113	0.179	0.205	0.258	0.296	0.345
DCP13	.600	-0.018	0.002	0.038	0.056	0.099	0.133	0.181	0.211	0.232	0.297	0.318
DCP14	.701	0.080	0.105	0.133	0.162	0.165	0.194	0.230	0.255	0.263	0.308	0.338
DCP15	.800	0.021	0.028	0.050	0.058	0.073	0.090	0.114	0.112	0.126	0.143	0.174
DCP16	.900	-0.107	-0.118	-0.110	-0.098	-0.081	-0.078	-0.092	-0.091	-0.077	-0.076	-0.087
DCP17	.969	-0.027	-0.042	-0.049	-0.052	-0.040	-0.037	-0.060	-0.048	-0.070	-0.072	-0.063

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.500 Rn = 7.9 x 10⁶

SOLID FLOOR AND CEILING

ALPHA		3.624	4.265	4.861	5.428	6.048	6.661	7.251	7.833	8.523	9.054	9.685
CN		0.542	0.610	0.671	0.734	0.795	0.862	0.927	0.973	1.005	1.037	1.086
CM		-0.009	-0.007	-0.006	-0.002	-0.002	0.002	0.004	0.013	0.019	0.025	0.025
DCP 1	.010	1.872	2.285	2.692	3.103	3.613	4.350	4.850	4.891	5.018	5.135	4.903
DCP 2	.020	1.698	2.043	2.369	2.709	2.836	3.757	4.425	4.830	5.058	5.152	5.031
DCP 3	.030	1.657	1.962	2.268	2.570	2.805	2.830	4.106	4.457	4.732	4.888	4.907
DCP 4	.049	1.715	1.964	2.226	2.485	2.750	3.051	2.726	4.125	4.429	4.625	4.688
DCP 5	.074	1.586	1.786	1.994	2.181	2.385	2.585	2.720	2.459	2.868	3.417	3.218
DCP 6	.099	1.414	1.611	1.702	1.858	2.072	2.219	2.348	2.349	2.284	2.453	2.579
DCP 7	.149	1.040	1.163	1.274	1.405	1.516	1.620	1.727	1.787	1.826	1.830	1.912
DCP 8	.200	0.825	0.921	1.022	1.123	1.210	1.295	1.379	1.424	1.484	1.503	1.786
DCP 9	.250	0.731	0.821	0.874	0.965	1.044	1.122	1.195	1.233	1.285	1.305	1.622
DCP10	.300	0.648	0.727	0.798	0.856	0.927	0.977	1.033	1.082	1.117	1.135	1.404
DCP11	.399	0.530	0.588	0.645	0.704	0.761	0.812	0.855	0.878	0.858	0.910	0.950
DCP12	.501	0.394	0.443	0.494	0.518	0.556	0.601	0.638	0.660	0.674	0.672	0.683
DCP13	.600	0.361	0.391	0.401	0.437	0.481	0.490	0.525	0.530	0 534	0.534	0.489
DCP14	.731	0.357	0.365	0.393	0.403	0.437	0.440	0.460	0.449	0.442	0.418	0.356
DCP15	.800	0.176	0.153	0.201	0.204	0.220	0.220	0.246	0.224	0.197	0.194	0.165
DCP16	.900	-0.071	-0.065	-0.065	-0.057	-0.056	-0.051	-0.047	-0.055	-0.055	-0.044	0.006
DCP17	.969	-0.066	-0.064	-0.063	-0.073	-0.077	-0.072	-0.075	-0.079	-0.081	-0.075	-0.052

ALPHA		10.272	10.886	11.445	12.043	12.681	13.258	13.850	14.465	15.113	15.624	16.230
CN		1.073	1.033	0.985	0.976	0.948	0.945	0.965	0.948	0.977	0.992	0.977
CM		0.014	0.010	-0.001	-0.009	-0.017	-0.032	-0.031	-0.038	-0.046	-0.055	-0.064
DCP 1	.010	4.704	4.662	4.452	4.332	4.241	4.124	4.025	3.885	3.851	3.809	3.731
DCP 2	.020	4.647	4.622	4.268	3.890	3.743	3.488	3.315	3.320	2.955	2.831	2.550
DCP 3	.030	4.891	4.849	4.552	3.707	3.[illegible]	3.360	3.218	3.120	2.941	2.815	2.668
DCP 4	.049	4.109	3.444	3.060	2.916	2.700	2.440	2.526	2.309	2.412	2.466	2.153
DCP 5	.074	3.071	2.795	2.483	2.497	2.128	2.072	2.129	1.951	2.078	2.143	1.979
DCP 6	.099	2.403	2.442	2.2[illegible]	2.181	2.073	1.967	2.012	1.945	2.030	2.049	1.943
DCP 7	.149	1.878	1.891	1.812	1.866	1.723	1.711	1.775	1.721	1.769	1.730	1.675
DCP 8	.200	1.786	1.675	1.517	1.562	1.546	1.474	1.543	1.533	1.538	1.520	1.581
DCP 9	.250	1.688	1.564	1.477	1.415	1.387	1.339	1.434	1.421	1.437	1.407	1.363
DCP10	.300	1.377	1.281	1.215	1.243	1.255	1.169	1.286	1.194	1.307	1.237	1.252
DCP11	.399	1.032	1.046	1.014	1.058	0.954	0.964	1.068	1.048	1.045	1.065	1.086
DCP12	.501	0.691	0.713	0.708	0.724	0.744	0.826	0.719	0.748	0.785	0.845	0.834
DCP13	.600	0.502	0.459	0.465	0.491	0.572	0.627	0.617	0.637	0.676	0.713	0.707
DCP14	.731	0.376	0.361	0.396	0.373	0.431	0.433	0.454	0.467	0.530	0.582	0.611
DCP15	.800	0.180	0.187	0.240	0.237	0.264	0.324	0.318	0.308	0.383	0.412	0.437
DCP16	.900	0.004	0.030	0.038	0.063	0.067	0.082	0.082	0.144	0.113	0.158	0.155
DCP17	.969	0.005	-0.005	-0.026	0.021	-0.026	0.012	0.008	0.007	-0.004	-0.006	0.037

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.500 Rn = 7.9 x 10^6 SOLID FLOOR AND CEILING

ALPHA		16.910	17.450	18.012
CN		0.576	0.580	0.576
CM		-0.070	-0.077	-0.080
DCP 1	.010	3.362	3.411	2.837
DCP 2	.020	2.537	2.684	2.751
DCP 3	.030	2.721	2.788	2.778
DCP 4	.049	2.042	1.965	2.026
DCP 5	.074	1.562	1.855	1.724
DCP 6	.099	1.823	1.725	1.736
DCP 7	.149	1.613	1.612	1.581
DCP 8	.200	1.465	1.364	1.421
DCP 9	.250	1.332	1.354	1.431
DCP10	.300	1.217	1.260	1.205
DCP11	.399	1.117	1.112	1.127
DCP12	.501	0.878	0.921	0.927
DCP13	.600	0.741	0.771	0.827
DCP14	.701	0.587	0.664	0.635
DCP15	.800	0.462	0.457	0.446
DCP16	.900	0.195	0.233	0.203
DCP17	.969	0.001	0.036	0.050

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 3.1 x 10^6 SOLID FLOOR AND CEILING

ALPHA		-8.428	-7.926	-7.413	-6.906	-6.365	-5.870	-5.329	-4.862	-4.304	-3.775	-2.702
CN		-0.642	-0.640	-0.617	-0.585	-0.563	-0.536	-0.498	-0.451	-0.396	-0.340	-0.213
CM		0.013	0.008	-0.001	-0.013	-0.026	-0.034	-0.041	-0.044	-0.039	-0.032	-0.025
DCP 1	.010	-2.372	2.448	-2.514	-2.528	-2.541	-2.599	-2.599	-2.588	-2.641	-2.798	-2.923
DCP 2	.020	-2.329	-2.393	-2.410	-2.349	-2.415	-2.443	-2.448	-2.476	-2.528	-2.656	-2.555
DCP 3	.030	-2.658	-2.715	-2.718	-2.687	-2.673	-2.633	-2.619	-2.505	-2.423	-2.369	-1.862
DCP 4	.049	-1.584	-1.577	-1.587	-1.612	-1.755	-1.813	-1.846	-1.846	-1.960	-1.858	-0.950
DCP 5	.074	-1.426	-1.408	-1.419	-1.426	-1.562	-1.648	-1.642	-1.635	-1.649	-1.306	-0.580
DCP 6	.099	-1.291	-1.294	-1.293	-1.322	-1.457	-1.459	-1.453	-1.483	-1.309	-0.910	-0.410
DCP 7	.149	-1.243	-1.271	-1.264	-1.289	-1.325	-1.351	-1.373	-1.273	-0.984	-0.646	-0.389
DCP 8	.200	-1.110	-1.148	-1.156	-1.128	-1.159	-1.125	-1.138	-0.953	-0.610	-0.443	-0.264
DCP 9	.250	-1.086	-1.119	-1.083	-1.082	-1.060	-1.004	-0.858	-0.693	-0.417	-0.395	-0.249
DCP10	.300	-0.899	-0.920	-0.897	-0.918	-0.792	-0.737	-0.589	-0.491	-0.363	-0.312	-0.186
DCP11	.399	-0.665	-0.628	-0.681	-0.570	-0.543	-0.486	-0.368	-0.300	-0.258	-0.245	-0.135
DCP12	.501	-0.540	-0.517	-0.446	-0.423	-0.324	-0.248	-0.218	-0.179	-0.202	-0.153	-0.094
DCP13	.600	-0.359	-0.387	-0.280	-0.197	-0.172	-0.124	-0.104	-0.066	-0.091	-0.082	-0.016
DCP14	.701	-0.113	-0.105	-0.093	-0.016	0.038	0.044	0.072	0.087	0.077	0.066	0.094
DCP15	.800	-0.101	-0.086	-0.028	0.012	0.032	0.051	0.075	0.067	0.049	0.035	0.041
DCP16	.900	-0.178	-0.134	-0.100	-0.097	-0.070	-0.033	-0.056	-0.044	-0.044	-0.064	-0.091
DCP17	.969	-0.079	-0.049	-0.086	-0.065	-0.026	-0.050	-0.007	0.001	-0.020	-0.034	-0.025

ALPHA		-2.206	-1.644	-1.129	-0.597	-0.071	0.451	0.988	1.514	2.026	2.540	3.076
CN		-0.140	-0.079	-0.006	0.061	0.126	0.201	0.269	0.346	0.419	0.492	0.565
CM		-0.022	-0.017	-0.016	-0.013	-0.009	-0.008	-0.005	-0.005	-0.001	0.000	0.000
DCP 1	.010	-2.517	-2.006	-1.563	-1.072	-0.682	-0.105	0.334	0.759	1.206	1.602	1.985
DCP 2	.020	-2.196	-1.604	-1.082	-0.777	-0.395	-0.058	0.272	0.616	0.962	1.304	1.617
DCP 3	.030	-1.064	-0.881	-0.701	-0.393	-0.073	0.217	0.526	0.822	1.150	1.458	1.749
DCP 4	.049	-0.753	-0.545	-0.287	-0.073	0.204	0.442	0.708	0.989	1.259	1.601	1.897
DCP 5	.074	-0.588	-0.197	0.012	0.227	0.417	0.633	0.856	1.084	1.331	1.698	1.999
DCP 6	.099	-0.268	-0.092	0.080	0.272	0.426	0.630	0.835	1.025	1.221	1.469	1.703
DCP 7	.149	-0.240	-0.120	0.003	0.134	0.271	0.410	0.550	0.733	0.890	0.928	0.925
DCP 8	.200	-0.168	-0.072	0.025	0.144	0.255	0.379	0.468	0.557	0.701	0.806	0.935
DCP 9	.250	-0.162	-0.064	0.031	0.116	0.219	0.293	0.404	0.484	0.592	0.691	0.782
DCP10	.300	-0.115	-0.035	0.036	0.117	0.203	0.272	0.352	0.440	0.510	0.602	0.666
DCP11	.399	-0.078	-0.031	0.047	0.102	0.179	0.243	0.287	0.357	0.414	0.491	0.568
DCP12	.501	-0.058	-0.009	0.059	0.099	0.129	0.197	0.226	0.267	0.329	0.367	0.416
DCP13	.600	0.021	0.029	0.073	0.107	0.142	0.166	0.194	0.231	0.273	0.303	0.343
DCP14	.701	0.124	0.154	0.178	0.188	0.195	0.228	0.261	0.289	0.286	0.324	0.344
DCP15	.800	0.050	0.062	0.054	0.071	0.059	0.069	0.083	0.097	0.108	0.120	0.153
DCP16	.900	-0.088	-0.150	-0.125	-0.142	-0.144	-0.139	-0.136	-0.116	-0.130	-0.121	-0.117
DCP17	.969	-0.039	-0.037	-0.062	-0.058	-0.086	-0.069	-0.095	-0.074	-0.089	-0.098	-0.094

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 3.1 x 10^6

SOLID FLOOR AND CEILING

ALPHA		3.600	4.131	4.662	5.172	5.687	6.215	6.740	7.235	7.798	8.301	8.818
CN		0.622	0.694	0.772	0.835	0.872	0.908	0.928	0.914	0.955	0.947	0.932
CM		0.004	0.008	0.013	0.018	0.025	0.026	0.025	0.026	0.022	0.006	-0.006
DCP 1	.010	2.139	2.407	2.944	3.277	3.472	3.715	3.648	3.225	3.527	3.921	3.771
DCP 2	.020	1.903	2.165	2.405	2.830	3.050	3.242	3.397	3.462	3.562	3.539	3.454
DCP 3	.030	1.985	2.187	2.372	2.748	3.014	3.211	3.344	3.400	3.448	3.391	3.175
DCP 4	.049	2.149	2.352	2.518	2.659	2.924	3.083	3.153	3.085	3.097	3.013	2.733
DCP 5	.074	2.229	2.485	2.654	2.758	2.919	2.928	2.959	2.877	2.872	2.617	2.376
DCP 6	.099	2.019	2.293	2.519	2.656	2.729	2.804	2.729	2.576	2.570	2.326	2.226
DCP 7	.149	0.970	1.389	2.011	2.258	2.176	2.457	1.992	2.003	2.131	1.926	1.812
DCP 8	.200	0.996	1.032	1.118	1.402	1.658	1.780	1.798	1.817	1.896	1.767	1.688
DCP 9	.250	0.850	0.909	0.947	0.997	1.194	1.376	1.488	1.481	1.587	1.456	1.372
DCP10	.300	0.737	0.782	0.827	0.842	0.922	1.016	1.124	1.182	1.231	1.188	1.242
DCP11	.399	0.586	0.657	0.690	0.719	0.711	0.757	0.826	0.817	0.881	0.922	0.967
DCP12	.501	0.449	0.489	0.503	0.541	0.530	0.556	0.574	0.572	0.613	0.675	0.674
DCP13	.600	0.367	0.387	0.413	0.417	0.406	0.412	0.427	0.368	0.370	0.473	0.502
DCP14	.701	0.363	0.359	0.383	0.370	0.345	0.305	0.283	0.285	0.290	0.352	0.400
DCP15	.800	0.146	0.149	0.156	0.160	0.137	0.136	0.124	0.141	0.163	0.181	0.184
DCP16	.900	-0.121	-0.113	-0.100	-0.091	-0.089	-0.065	-0.052	-0.088	-0.054	-0.000	0.018
DCP17	.969	-0.099	-0.096	-0.109	-0.082	-0.092	-0.095	-0.100	-0.107	-0.085	-0.085	-0.035

ALPHA		9.363	10.402	10.906	11.442	11.936	12.492	12.981	13.511	14.035	15.420
CN		0.936	0.927	0.912	0.849	0.848	0.867	0.895	0.920	0.924	0.991
CM		-0.029	-0.063	-0.068	-0.066	-0.063	-0.067	-0.070	-0.072	-0.070	-0.083
DCP 1	.010	3.536	2.403	2.177	1.972	1.885	1.993	2.034	2.025	2.047	1.907
DCP 2	.020	3.014	2.124	1.901	1.712	1.696	1.674	1.713	1.727	1.726	1.809
DCP 3	.030	2.926	2.037	1.870	1.732	1.709	1.718	1.742	1.755	1.769	1.796
DCP 4	.049	2.642	2.861	2.784	2.661	2.605	2.605	2.563	2.646	2.652	2.451
DCP 5	.074	2.387	2.493	2.459	2.467	2.405	2.438	2.417	2.476	2.504	2.407
DCP 6	.099	2.208	2.282	2.248	2.213	2.237	2.264	2.262	2.277	2.462	2.448
DCP 7	.149	1.677	1.479	1.393	1.259	1.337	1.386	1.570	1.601	1.621	1.896
DCP 8	.200	1.444	1.156	1.169	1.057	1.008	1.070	1.093	1.162	1.139	1.262
DCP 9	.250	1.274	1.075	1.062	0.926	0.990	1.002	1.041	1.075	1.078	1.208
DCP10	.300	1.127	1.028	0.983	0.870	0.889	0.926	0.978	0.963	0.990	1.098
DCP11	.399	0.945	0.980	0.926	0.924	0.850	0.857	0.884	0.907	0.913	1.044
DCP12	.501	0.795	0.824	0.876	0.734	0.731	0.749	0.793	0.793	0.818	0.894
DCP13	.600	0.662	0.751	0.691	0.679	0.658	0.670	0.721	0.730	0.706	0.787
DCP14	.701	0.512	0.633	0.696	0.638	0.641	0.635	0.664	0.682	0.663	0.720
DCP15	.800	0.278	0.482	0.529	0.554	0.530	0.543	0.564	0.544	0.557	0.562
DCP16	.900	0.055	0.133	0.140	0.171	0.142	0.196	0.162	0.193	0.179	0.229
DCP17	.969	-0.057	-0.028	-0.067	-0.049	-0.052	-0.059	-0.044	-0.001	-0.017	-0.012

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 6.2 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-9.491	-8.990	-8.374	-7.767	-7.170	-6.568	-5.963	-5.377	-4.776	-4.176	-3.539
CN		-0.747	-0.675	-0.658	-0.611	-0.582	-0.514	-0.482	-0.449	-0.389	-0.337	-0.279
CM		0.007	-0.006	-0.018	-0.034	-0.033	-0.046	-0.044	-0.041	-0.038	-0.032	-0.029
DCP 1	.010	-3.175	-3.249	-3.295	-3.406	-3.700	-3.598	-3.029	-2.892	-3.168	-3.363	-3.323
DCP 2	.020	-2.511	-2.595	-2.411	-2.322	-2.051	-2.200	-2.570	-2.633	-2.858	-2.888	-2.898
DCP 3	.030	-2.702	-2.732	-2.519	-2.373	-1.883	-2.058	-2.330	-2.447	-2.611	-2.595	-2.269
DCP 4	.049	-2.491	-2.083	-2.382	-2.942	-2.455	-2.428	-2.255	-1.979	-2.111	-1.889	-1.749
DCP 5	.074	-2.026	-1.933	-2.072	-2.016	-2.078	-2.015	-1.886	-1.688	-1.566	-1.115	-0.805
DCP 6	.099	-1.809	-1.628	-1.768	-1.689	-1.688	-1.748	-1.614	-1.480	-1.132	-0.801	-0.592
DCP 7	.149	-1.362	-1.465	-1.160	-1.358	-1.402	-1.300	-1.216	-1.117	-0.714	-0.556	-0.465
DCP 8	.200	-1.273	-1.247	-1.156	-1.290	-1.095	-0.949	-0.904	-0.880	-0.584	-0.472	-0.405
DCP 9	.250	-1.205	-1.128	-1.143	-1.038	-0.827	-0.759	-0.669	-0.596	-0.444	-0.403	-0.322
DCP10	.300	-0.947	-0.843	-0.936	-0.793	-0.697	-0.582	-0.450	-0.449	-0.342	-0.286	-0.239
DCP11	.399	-0.671	-0.579	-0.653	-0.545	-0.548	-0.382	-0.347	-0.301	-0.258	-0.214	-0.178
DCP12	.501	-0.507	-0.416	-0.435	-0.315	-0.394	-0.246	-0.253	-0.198	-0.190	-0.165	-0.144
DCP13	.600	-0.422	-0.328	-0.264	-0.165	-0.205	-0.099	-0.104	-0.092	-0.079	-0.080	-0.061
DCP14	.701	-0.234	-0.134	-0.0	0.037	0.068	0.079	0.049	0.068	0.057	0.076	0.081
DCP15	.800	-0.156	-0.132	-0.	-0.005	0.043	0.061	0.082	0.031	0.045	0.023	0.033
DCP16	.900	-0.153	-0.081	-0.050	-0.029	-0.047	-0.032	-0.032	-0.044	-0.075	-0.088	-0.078
DCP17	.969	-0.021	-0.049	-0.062	-0.056	-0.018	-0.002	-0.015	0.003	-0.015	-0.028	-0.014

ALPHA		-2.976	-2.332	-1.729	-1.152	-0.543	0.103	0.678	1.288	1.923	2.471	3.763
CN		-0.216	-0.146	-0.079	-0.002	0.070	0.143	0.216	0.292	0.369	0.438	0.591
CM		-0.025	-0.021	-0.018	-0.017	-0.015	-0.014	-0.012	-0.011	-0.011	-0.009	-0.003
DCP 1	.010	-3.149	-2.787	-2.245	-1.592	-1.104	-0.650	-0.197	0.185	0.625	1.023	1.794
DCP 2	.020	-2.740	-1.853	-1.342	-1.066	-0.719	-0.390	-0.099	0.335	0.686	1.017	1.687
DCP 3	.030	-1.674	-1.250	-1.035	-0.748	-0.444	-0.138	0.182	0.484	0.894	1.108	1.714
DCP 4	.049	-0.966	-0.757	-0.531	-0.282	-0.026	0.220	0.495	0.765	1.045	1.337	1.961
DCP 5	.074	-0.601	-0.392	-0.205	0.004	0.229	0.443	0.632	0.886	1.137	1.369	1.949
DCP 6	.099	-0.464	-0.297	-0.124	0.057	0.254	0.451	0.628	0.824	1.039	1.255	1.765
DCP 7	.149	-0.339	-0.222	-0.084	0.046	0.182	0.319	0.471	0.632	0.753	0.829	1.115
DCP 8	.200	-0.301	-0.213	-0.095	0.021	0.135	0.248	0.330	0.480	0.593	0.691	0.927
DCP 9	.250	-0.243	-0.155	-0.074	0.026	0.121	0.221	0.317	0.419	0.514	0.616	0.787
DCP10	.300	-0.175	-0.101	-0.023	0.078	0.141	0.234	0.309	0.386	0.469	0.558	0.707
DCP11	.399	-0.122	-0.061	-0.006	0.057	0.127	0.192	0.259	0.326	0.379	0.459	0.567
DCP12	.501	-0.096	-0.051	-0.015	0.053	0.089	0.143	0.188	0.235	0.285	0.338	0.428
DCP13	.600	-0.033	-0.004	0.024	0.066	0.108	0.135	0.190	0.217	0.270	0.287	0.379
DCP14	.701	0.102	0.124	0.140	0.171	0.196	0.227	0.245	0.269	0.292	0.315	0.366
DCP15	.800	0.042	0.051	0.050	0.071	0.079	0.088	0.118	0.117	0.136	0.136	0.164
DCP16	.900	-0.103	-0.117	-0.113	-0.126	-0.118	-0.107	-0.132	-0.105	-0.092	-0.096	-0.094
DCP17	.969	-0.037	-0.046	-0.041	-0.055	-0.058	-0.069	-0.072	-0.075	-0.065	-0.082	-0.092

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.597 Rn = 6.2 x 10^6

SOLID FLOOR AND CEILING

ALPHA		4.311	4.921	5.566	6.153	6.760	7.360	7.971	8.576	9.788	10.338	10.937
CN		0.655	0.722	0.807	0.867	0.920	0.935	0.948	0.953	0.965	0.936	0.965
CM		0.001	0.004	0.007	0.014	0.020	0.025	0.030	0.029	0.014	0.002	-0.005
DCP 1	.010	2.183	2.546	2.968	3.249	3.426	3.500	3.603	3.697	3.802	3.793	3.766
DCP 2	.020	1.988	2.248	2.530	2.673	3.222	3.325	3.437	3.557	3.678	3.635	3.692
DCP 3	.030	1.947	2.136	2.351	2.789	3.014	3.132	3.269	3.370	3.449	3.176	3.316
DCP 4	.049	2.220	2.302	2.512	2.770	3.007	3.110	3.253	3.310	3.195	2.811	2.878
DCP 5	.074	2.279	2.490	2.648	2.784	2.980	3.103	3.155	3.077	2.682	2.452	2.570
DCP 6	.099	2.143	2.467	2.740	2.866	3.000	3.013	2.976	2.702	2.434	2.293	2.329
DCP 7	.149	1.717	1.447	2.123	2.486	2.626	2.434	2.200	2.151	2.099	2.030	1.890
DCP 8	.200	0.992	1.014	1.029	1.235	1.553	1.744	1.825	1.845	1.853	1.649	1.586
DCP 9	.250	0.877	0.921	0.936	0.976	1.044	1.236	1.400	1.490	1.514	1.370	1.535
DCP10	.300	0.784	0.827	0.873	0.867	0.905	0.992	1.118	1.239	1.254	1.238	1.317
DCP11	.399	0.639	0.674	0.729	0.745	0.750	0.740	0.797	0.870	0.900	0.915	0.992
DCP12	.501	0.466	0.503	0.549	0.552	0.569	0.549	0.558	0.543	0.617	0.706	0.692
DCP13	.600	0.376	0.415	0.455	0.447	0.457	0.433	0.432	0.390	0.449	0.445	0.505
DCP14	.701	0.365	0.389	0.404	0.409	0.409	0.374	0.317	0.297	0.358	0.361	0.364
DCP15	.800	0.176	0.160	0.188	0.198	0.191	0.171	0.142	0.134	0.150	0.197	0.235
DCP16	.900	-0.095	-0.078	-0.080	-0.067	-0.086	-0.091	-0.106	-0.086	-0.017	0.005	0.020
DCP17	.969	-0.130	-0.093	-0.078	-0.091	-0.091	-0.073	-0.101	-0.091	-0.078	-0.077	-0.050

ALPHA		11.607	12.139	12.737	13.413	14.581	15.188	15.760	16.978
CN		0.967	0.937	0.925	0.920	0.896	0.955	0.918	0.964
CM		-0.051	-0.047	-0.063	-0.073	-0.077	-0.084	-0.075	-0.082
DCP	.010	2.646	2.923	2.120	1.964	1.832	1.832	1.817	1.794
DCP 2	.020	2.489	2.834	2.041	1.828	1.721	1.768	1.733	1.782
DCP 3	.030	2.496	2.791	2.145	1.905	1.747	1.750	1.739	1.730
DCP 4	.049	3.173	2.681	2.870	2.767	2.679	2.614	2.639	2.683
DCP 5	.074	2.657	2.302	2.571	2.554	2.424	2.510	2.472	2.543
DCP 6	.099	2.390	2.011	2.304	2.316	2.197	2.275	2.289	2.362
DCP 7	.149	1.566	1.521	1.429	1.370	1.476	1.669	1.640	1.770
DCP 8	.200	1.255	1.232	1.149	1.085	1.059	1.150	1.083	1.187
DCP 9	.250	1.243	1.216	1.119	1.060	1.012	1.073	1.055	1.113
DCP10	.300	1.134	1.181	1.007	0.997	0.943	1.030	0.985	1.040
DCP11	.399	1.004	1.059	0.975	0.949	0.916	1.019	0.913	0.954
DCP12	.501	0.811	0.866	0.937	0.841	0.787	0.847	0.834	0.868
DCP13	.600	0.705	0.808	0.753	0.749	0.732	0.782	0.737	0.720
DCP14	.701	0.575	0.517	0.629	0.717	0.689	0.719	0.689	0.714
DCP15	.800	0.429	0.383	0.450	0.537	0.563	0.594	0.536	0.626
DCP16	.900	0.136	0.125	0.165	0.147	0.212	0.218	0.215	0.229
DCP17	.969	-0.091	-0.008	0.033	0.033	-0.023	0.091	-0.010	0.001

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.609 Rn = 9.1 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-8.219	-7.709	-7.234	-6.686	-6.201	-5.692	-5.147	-4.626	-4.113	-3.579	-3.096
CN		-0.643	-0.655	-0.632	-0.577	-0.577	-0.523	-0.466	-0.442	-0.389	-0.340	-0.283
CM		-0.004	-0.020	-0.031	-0.041	-0.046	-0.045	-0.049	-0.044	-0.038	-0.034	-0.029
DCP 1	.010	-2.999	-2.931	-3.118	-3.233	-3.348	-3.440	-3.242	-3.074	-3.213	-3.422	-3.420
DCP 2	.020	-2.692	-2.657	-2.579	-3.098	-3.044	-2.909	-2.900	-2.731	-2.913	-2.538	-2.870
DCP 3	.030	-2.442	-2.634	-3.036	-2.687	-2.934	-2.751	-2.320	-2.639	-2.640	-2.531	-2.265
DCP 4	.049	-1.876	-2.489	-2.285	-2.154	-2.426	-2.490	-2.342	-2.279	-2.150	-1.842	-1.368
DCP 5	.074	-1.887	-1.911	-1.689	-1.739	-2.025	-1.995	-1.868	-1.795	-1.448	-1.114	-0.798
DCP 6	.099	-1.425	-1.666	-1.735	-1.741	-1.807	-1.677	-1.641	-1.441	-1.092	-0.795	-0.602
DCP 7	.149	-1.020	-1.258	-1.474	-1.519	-1.376	-1.178	-1.116	-1.022	-0.733	-0.591	-0.484
DCP 8	.200	-0.990	-1.242	-1.191	-1.076	-1.064	-0.927	-0.802	-0.684	-0.560	-0.490	-0.409
DCP 9	.250	-0.976	-1.116	-1.018	-0.941	-0.922	-0.811	-0.639	-0.563	-0.477	-0.405	-0.332
DCP10	.300	-0.850	-1.025	-0.805	-0.710	-0.647	-0.636	-0.485	-0.430	-0.349	-0.305	-0.250
DCP11	.399	-0.778	-0.584	-0.547	-0.459	-0.458	-0.336	-0.295	-0.297	-0.264	-0.211	-0.184
DCP12	.501	-0.529	-0.367	-0.345	-0.319	-0.282	-0.259	-0.218	-0.212	-0.200	-0.168	-0.139
DCP13	.600	-0.323	-0.219	-0.194	-0.165	-0.174	-0.077	-0.060	-0.067	-0.074	-0.084	-0.053
DCP14	.701	-0.068	-0.056	-0.058	0.057	0.076	0.071	0.082	0.079	0.065	0.071	0.092
DCP15	.800	-0.066	-0.025	0.037	0.037	0.045	0.055	0.051	0.042	0.035	0.037	0.037
DCP16	.900	-0.161	-0.094	-0.081	-0.015	-0.025	-0.031	-0.022	-0.052	-0.063	-0.076	-0.093
DCP17	.969	-0.083	-0.024	-0.015	-0.014	0.007	-0.001	0.001	-0.009	-0.022	-0.019	-0.036

ALPHA		-2.571	-2.027	-1.490	-0.964	-0.444	0.079	0.572	1.135	1.651	2.181	2.693
CN		-0.219	-0.153	-0.075	-0.005	0.069	0.140	0.218	0.292	0.368	0.448	0.523
CM		-0.026	-0.020	-0.019	-0.018	-0.016	-0.014	-0.014	-0.012	-0.011	-0.010	-0.008
DCP 1	.010	-3.367	-2.945	-2.229	-1.531	-1.010	-0.545	-0.088	0.327	0.760	1.182	1.600
DCP 2	.020	-2.698	-1.654	-1.480	-1.118	-0.760	-0.395	-0.035	0.316	0.682	1.030	1.378
DCP 3	.030	-1.605	-1.273	-1.026	-0.716	-0.417	-0.114	0.196	0.519	0.835	1.155	1.467
DCP 4	.049	-0.560	-0.783	-0.548	-0.308	-0.045	0.204	0.466	0.740	1.031	1.333	1.653
DCP 5	.074	-0.611	-0.416	-0.212	-0.008	0.210	0.433	0.669	0.887	1.130	1.376	1.652
DCP 6	.099	-0.449	-0.289	-0.113	0.061	0.260	0.443	0.634	0.824	1.034	1.248	1.474
DCP 7	.149	-0.367	-0.247	-0.103	0.013	0.157	0.290	0.429	0.575	0.718	0.860	1.005
DCP 8	.200	-0.321	-0.209	-0.106	0.009	0.123	0.242	0.351	0.463	0.586	0.650	0.812
DCP 9	.250	-0.254	-0.169	-0.077	0.014	0.118	0.217	0.309	0.412	0.512	0.607	0.702
DCP10	.300	-0.180	-0.111	-0.024	0.053	0.125	0.210	0.298	0.382	0.460	0.556	0.621
DCP11	.399	-0.119	-0.066	0.005	0.064	0.126	0.190	0.268	0.331	0.392	0.460	0.516
DCP12	.501	-0.097	-0.070	-0.010	0.044	0.090	0.140	0.186	0.241	0.291	0.347	0.392
DCP13	.600	-0.035	0.001	0.043	0.077	0.120	0.141	0.187	0.223	0.260	0.301	0.338
DCP14	.701	0.111	0.121	0.146	0.171	0.202	0.218	0.248	0.272	0.301	0.325	0.349
DCP15	.800	0.035	0.037	0.051	0.058	0.078	0.089	0.112	0.114	0.130	0.157	0.165
DCP16	.900	-0.103	-0.128	-0.121	-0.098	-0.107	-0.104	-0.098	-0.090	-0.093	-0.084	-0.076
DCP17	.969	-0.025	-0.037	-0.047	-0.042	-0.056	-0.061	-0.066	-0.067	-0.070	-0.076	-0.074

. AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.609 Rn = 9.1 x 10^6 SOLID FLOOR AND CEILING

ALPHA		3.233	3.897	4.273	4.765	5.317	5.836	6.363	6.842	7.372	7.909	8.427
CN		0.600	0.684	0.733	0.804	0.886	0.924	0.954	0.974	0.982	1.000	0.998
CM		-0.004	0.001	0.001	0.006	0.013	0.021	0.025	0.028	0.032	0.010	-0.003
DCP 1	.010	2.023	2.482	2.783	3.225	3.481	3.635	3.778	3.853	3.959	3.934	3.962
DCP 2	.020	1.709	2.065	2.266	2.615	3.036	3.237	3.395	3.490	3.614	3.601	3.647
DCP 3	.030	1.763	2.063	2.214	2.462	2.915	3.124	3.294	3.385	3.498	3.503	3.572
DCP 4	.049	1.568	2.280	2.430	2.505	2.831	3.023	3.185	3.279	3.399	3.410	3.470
DCP 5	.074	1.942	2.372	2.535	2.658	2.845	3.039	3.151	3.246	3.323	3.276	3.176
DCP 6	.099	1.777	2.286	2.587	2.751	2.910	3.062	3.126	3.153	3.091	2.880	2.650
DCP 7	.149	1.125	1.167	1.237	1.822	2.561	2.633	2.536	2.263	2.273	1.779	1.635
DCP 8	.200	0.910	1.020	1.032	1.125	1.165	1.405	1.564	1.755	1.836	1.501	1.455
DCP 9	.250	0.798	0.894	0.937	0.954	0.995	1.127	1.248	1.436	1.401	1.485	1.456
DCP10	.300	0.705	0.785	0.832	0.866	0.862	0.844	0.595	1.109	1.161	1.361	1.246
DCP11	.399	0.590	0.651	0.695	0.732	0.762	0.773	0.783	0.801	0.837	0.992	1.027
DCP12	.501	0.429	0.478	0.518	0.547	0.575	0.571	0.566	0.573	0.582	0.669	0.729
DCP13	.600	0.364	0.414	0.431	0.444	0.469	0.464	0.448	0.439	0.394	0.514	0.557
DCP14	.701	0.373	0.390	0.404	0.409	0.419	0.399	0.375	0.353	0.323	0.356	0.386
DCP15	.800	0.177	0.179	0.189	0.200	0.199	0.191	0.172	0.165	0.140	0.157	0.192
DCP16	.900	-0.076	-0.085	-0.078	-0.059	-0.063	-0.075	-0.071	-0.092	-0.066	0.002	0.068
DCP17	.969	-0.085	-0.092	-0.082	-0.091	-0.080	-0.090	-0.084	-0.079	-0.109	-0.046	-0.035

ALPHA		8.949	9.469	9.972	10.465	10.989	11.547	12.041	12.587	13.091	13.586	14.116
CN		0.991	0.943	0.985	0.994	0.992	0.946	0.885	0.900	0.972	0.981	1.056
CM		-0.015	-0.007	-0.037	-0.026	-0.032	-0.036	-0.048	-0.056	-0.055	-0.071	-0.054
DCP 1	.010	3.542	3.549	3.714	3.684	4.077	3.582	4.071	3.507	3.370	3.622	3.270
DCP 2	.020	3.668	3.683	3.674	3.641	3.654	3.085	3.636	3.470	2.734	3.124	2.578
DCP 3	.030	3.624	3.602	3.715	3.665	3.517	2.940	3.231	3.059	3.047	2.937	2.963
DCP 4	.049	3.514	3.176	3.435	3.091	2.442	2.488	2.207	2.398	2.155	2.654	2.740
DCP 5	.074	3.097	2.544	2.743	2.605	1.730	2.081	1.572	1.579	1.941	1.710	2.442
DCP 6	.099	2.500	2.214	2.386	2.395	1.634	1.975	1.439	1.501	1.893	1.661	2.349
DCP 7	.149	1.463	1.745	1.362	1.601	1.533	1.735	1.298	1.303	1.709	1.422	1.896
DCP 8	.200	1.372	1.472	1.215	1.380	1.401	1.440	1.285	1.286	1.560	1.430	1.638
DCP 9	.250	1.339	1.332	1.198	1.323	1.226	1.297	1.174	1.237	1.483	1.298	1.501
DCP10	.300	1.200	1.152	1.128	1.241	1.136	1.254	1.091	1.072	1.278	1.240	1.396
DCP11	.399	0.977	0.957	0.959	1.055	0.979	1.036	1.051	0.972	1.066	1.101	1.155
DCP12	.501	0.769	0.681	0.813	0.810	0.814	0.776	0.847	0.828	0.775	0.819	0.834
DCP13	.600	0.600	0.534	0.665	0.605	0.591	0.650	0.646	0.735	0.693	0.768	0.735
DCP14	.701	0.469	0.378	0.492	0.502	0.462	0.494	0.499	0.582	0.586	0.654	0.586
DCP15	.800	0.276	0.248	0.386	0.312	0.315	0.322	0.361	0.374	0.418	0.435	0.434
DCP16	.900	0.074	0.044	0.171	0.094	0.089	0.086	0.119	0.116	0.135	0.179	0.154
DCP17	.969	-0.028	-0.035	0.049	-0.049	-0.065	-0.050	-0.042	0.024	-0.010	0.047	-0.016

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.609 Rn = 9.1 x 10^6 SOLID FLOOR AND CEILING

ALPHA		14.666	15.169	15.649	16.176	16.720
CN		1.061	1.081	1.063	1.083	1.086
CM		-0.070	-0.078	-0.083	-0.087	-0.090
DCP 1	.010	3.492	3.375	3.617	3.125	3.249
DCP 2	.020	2.630	3.030	3.340	2.411	2.935
DCP 3	.030	2.994	2.593	1.963	3.028	3.114
DCP 4	.049	2.377	2.563	2.484	2.530	2.426
DCP 5	.074	2.173	2.242	2.185	2.190	2.189
DCP 6	.099	2.098	2.138	2.211	2.178	2.002
DCP 7	.149	1.833	1.855	1.972	1.855	1.758
DCP 8	.200	1.644	1.646	1.803	1.604	1.623
DCP 9	.250	1.480	1.446	1.194	1.390	1.541
DCP10	.300	1.334	1.301	1.085	1.292	1.370
DCP11	.399	1.188	1.158	1.075	1.122	1.045
DCP12	.501	0.964	1.020	0.927	1.002	0.925
DCP13	.600	0.773	0.845	0.824	0.857	0.825
DCP14	.701	0.664	0.672	0.757	0.746	0.757
DCP15	.800	0.482	0.495	0.605	0.562	0.601
DCP16	.900	0.179	0.224	0.239	0.254	0.309
DCP17	.969	0.024	0.022	0.026	0.017	0.061

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.705 Rn = 10.0 x 10^6

SOLID FLOOR AND CEILING

ALPHA		-9.601	-8.981	-8.442	-7.861	-7.245	-6.641	-6.104	-5.490	-4.832	-4.278	-3.652
CN		-0.671	-0.682	-0.702	-0.762	-0.734	-0.684	-0.645	-0.578	-0.534	-0.468	-0.357
CM		0.034	0.026	-0.005	0.011	0.004	-0.028	-0.046	-0.053	-0.051	-0.045	-0.038
DCP 1	.010	-1.917	-2.910	-3.136	-3.137	-3.257	-3.215	-3.271	-3.199	-3.154	-3.058	-2.957
DCP 2	.020	-2.798	-2.846	-2.879	-2.932	-2.927	-3.102	-3.120	-3.053	-3.014	-2.897	-2.772
DCP 3	.030	-2.530	-2.480	-2.671	-2.380	-2.294	-2.827	-2.801	-2.716	-2.786	-2.672	-2.537
DCP 4	.049	-2.199	-2.255	-2.346	-2.739	-2.681	-2.623	-2.595	-2.505	-2.429	-2.289	-2.122
DCP 5	.074	-1.743	-1.806	-1.862	-2.438	-2.378	-2.323	-2.288	-2.189	-2.100	-1.967	-1.784
DCP 6	.099	-1.656	-1.649	-1.708	-2.200	-2.188	-2.089	-2.100	-2.021	-1.935	-1.793	-1.607
DCP 7	.149	-1.410	-1.417	-1.444	-1.794	-1.885	-1.475	-1.333	-1.763	-1.759	-1.612	-0.385
DCP 8	.200	-0.707	-0.717	-1.118	-1.005	-1.016	-0.972	-1.100	-1.021	-1.076	-0.631	-0.324
DCP 9	.250	-0.680	-0.732	-1.112	-0.899	-0.710	-0.962	-1.097	-0.745	-0.691	-0.337	-0.298
DCP10	.300	-0.618	-0.709	-0.960	-0.727	-0.613	-0.881	-0.917	-0.494	-0.346	-0.243	-0.242
DCP11	.395	-0.616	-0.610	-0.700	-0.551	-0.512	-0.681	-0.622	-0.477	-0.212	-0.221	-0.194
DCP12	.501	-0.586	-0.570	-0.467	-0.519	-0.518	-0.644	-0.385	-0.318	-0.179	-0.190	-0.158
DCP13	.600	-0.426	-0.378	-0.343	-0.444	-0.464	-0.244	-0.134	-0.171	-0.100	-0.099	-0.070
DCP14	.701	-0.225	-0.242	-0.134	-0.182	-0.194	-0.031	0.087	0.101	0.076	0.077	0.094
DCP15	.800	-0.239	-0.187	-0.068	-0.252	-0.196	0.011	0.087	0.098	0.029	0.018	0.021
DCP16	.900	-0.342	-0.353	-0.135	-0.246	-0.201	-0.070	-0.043	-0.038	-0.111	-0.130	-0.125
DCP17	.969	-0.144	-0.118	-0.020	-0.122	-0.090	-0.055	-0.004	-0.024	-0.031	-0.038	-0.026

ALPHA		-3.037	-2.465	-1.858	-1.188	-0.584	-0.021	0.604	1.257	1.810	2.401	3.066
CN		-0.270	-0.183	-0.104	-0.024	0.059	0.143	0.230	0.302	0.395	0.492	0.580
CM		-0.033	-0.030	-0.025	-0.021	-0.019	-0.016	-0.015	-0.013	-0.010	-0.005	-0.004
DCP 1	.010	-2.814	-2.586	-2.360	-1.998	-1.270	-0.754	-0.329	0.081	0.428	0.769	1.087
DCP 2	.020	-2.598	-2.367	-2.058	-1.347	-0.940	-0.537	-0.175	0.158	0.470	0.761	1.022
DCP 3	.030	-2.339	-2.083	-1.680	-0.873	-0.583	-0.257	0.055	0.351	0.615	0.858	1.083
DCP 4	.049	-1.913	-1.593	-0.596	-0.419	-0.142	0.136	0.416	0.690	0.965	1.159	1.356
DCP 5	.074	-1.482	-0.218	-0.244	-0.052	0.186	0.438	0.729	0.942	1.139	1.332	1.533
DCP 6	.099	-0.468	-0.249	-0.164	0.017	0.239	0.472	0.745	1.066	1.272	1.450	1.633
DCP 7	.149	-0.300	-0.265	-0.139	0.005	0.159	0.327	0.513	0.489	1.206	1.463	1.625
DCP 8	.200	-0.314	-0.249	-0.137	-0.007	0.120	0.248	0.388	0.518	0.510	1.360	1.575
DCP 9	.250	-0.273	-0.208	-0.106	0.001	0.108	0.223	0.335	0.450	0.506	0.515	1.107
DCP10	.300	-0.207	-0.136	-0.050	0.021	0.130	0.226	0.320	0.418	0.487	0.504	0.546
DCP11	.399	-0.155	-0.090	-0.030	0.048	0.125	0.199	0.277	0.346	0.408	0.457	0.464
DCP12	.501	-0.112	-0.066	-0.017	0.032	0.087	0.148	0.203	0.259	0.314	0.349	0.374
DCP13	.600	-0.033	0.009	0.039	0.077	0.114	0.158	0.202	0.233	0.280	0.310	0.333
DCP14	.701	0.124	0.156	0.177	0.191	0.219	0.245	0.277	0.297	0.324	0.336	0.359
DCP15	.800	0.040	0.052	0.059	0.072	0.081	0.094	0.106	0.118	0.128	0.142	0.157
DCP16	.900	-0.119	-0.110	-0.118	-0.129	-0.121	-0.133	-0.131	-0.128	-0.122	-0.122	-0.106
DCP17	.969	-0.025	-0.021	-0.025	-0.039	-0.051	-0.057	-0.061	-0.070	-0.071	-0.082	-0.073

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.705 Rn = 10.0 x 10^6 SOLID FLOOR AND CEILING

ALPHA		3.609	4.231	4.871	5.490	6.061	6.648	7.290	7.854	8.447	9.099	9.720
CN		0.673	0.782	0.835	0.825	0.848	0.867	0.893	0.921	0.930	0.891	0.875
CM		-0.001	-0.001	0.002	0.008	0.002	0.002	-0.001	-0.005	-0.006	-0.027	-0.035
DCP 1	.010	1.374	1.614	1.836	1.998	2.111	2.260	2.381	2.464	2.575	2.647	2.680
DCP 2	.020	1.252	1.453	1.611	1.723	1.833	1.979	2.131	2.231	2.367	2.457	2.484
DCP 3	.030	1.277	1.424	1.556	1.660	1.740	1.882	2.039	2.146	2.260	2.357	2.401
DCP 4	.049	1.549	1.668	1.773	1.854	1.902	1.966	2.076	2.174	2.270	2.345	2.379
DCP 5	.074	1.692	1.805	1.925	1.999	2.034	2.089	2.165	2.234	2.320	2.396	2.422
DCP 6	.099	1.792	1.902	2.008	2.077	2.115	2.157	2.221	2.279	2.355	2.410	2.411
DCP 7	.149	1.776	1.886	1.981	2.042	2.086	2.131	2.175	2.218	2.271	2.119	1.975
DCP 8	.200	1.719	1.824	1.919	1.985	2.021	2.069	2.118	2.139	1.948	1.187	1.053
DCP 9	.250	1.666	1.776	1.875	1.936	1.927	1.696	1.570	1.544	1.287	1.143	0.973
DCP10	.300	0.902	1.668	1.686	1.195	1.193	1.199	1.243	1.248	1.279	0.992	0.932
DCP11	.399	0.439	0.730	0.928	0.965	0.959	1.000	0.952	0.998	1.048	0.946	0.916
DCP12	.501	0.372	0.343	0.510	0.630	0.617	0.661	0.718	0.738	0.792	0.752	0.686
DCP13	.600	0.349	0.315	0.264	0.308	0.439	0.450	0.503	0.535	0.485	0.608	0.648
DCP14	.701	0.363	0.347	0.286	0.212	0.240	0.270	0.303	0.321	0.318	0.422	0.473
DCP15	.800	0.165	0.159	0.139	0.085	0.112	0.097	0.122	0.121	0.167	0.271	0.327
DCP16	.900	-0.099	-0.106	-0.114	-0.126	-0.114	-0.106	-0.118	-0.070	-0.047	0.060	0.101
DCP17	.969	-0.070	-0.069	-0.089	-0.079	-0.076	-0.091	-0.060	-0.048	-0.082	-0.001	0.007

ALPHA		10.290	10.818	11.511	12.116	12.619	13.264	13.880	14.469	15.090	15.656	17.507
CN		0.913	0.931	0.968	0.929	0.945	0.970	0.990	1.003	1.036	1.048	1.097
CM		-0.036	-0.044	-0.039	-0.049	-0.052	-0.054	-0.057	-0.064	-0.070	-0.073	-0.109
DCP 1	.010	2.770	2.848	2.920	2.929	2.998	3.073	3.078	3.141	3.199	3.226	2.702
DCP 2	.020	2.600	2.692	2.787	2.783	2.867	2.954	2.980	3.041	3.116	3.173	2.564
DCP 3	.030	2.501	2.578	2.669	2.679	2.755	2.843	2.876	2.942	2.994	3.006	2.839
DCP 4	.049	2.472	2.543	2.541	2.636	2.709	2.753	2.776	2.767	2.768	2.709	1.881
DCP 5	.074	2.498	2.561	2.346	2.607	2.622	2.647	2.661	2.643	2.600	2.529	1.863
DCP 6	.099	2.473	2.468	2.192	2.461	2.477	2.456	2.487	2.446	2.400	2.324	1.754
DCP 7	.149	2.056	1.980	1.912	1.907	1.971	2.080	2.133	2.171	2.176	2.195	1.671
DCP 8	.200	1.135	1.133	1.634	1.055	1.038	1.056	1.100	1.042	1.137	1.147	1.743
DCP 9	.250	1.071	1.042	1.436	1.014	0.976	1.051	1.054	1.076	1.099	1.148	1.723
DCP10	.300	0.990	0.982	1.229	0.906	0.934	0.958	1.000	0.969	1.035	1.092	1.463
DCP11	.399	0.930	0.950	0.951	0.905	0.907	0.868	0.914	0.938	0.977	1.024	1.256
DCP12	.501	0.745	0.771	0.782	0.713	0.684	0.842	0.769	0.743	0.908	0.893	0.931
DCP13	.600	0.638	0.595	0.588	0.671	0.700	0.705	0.677	0.731	0.732	0.781	0.854
DCP14	.701	0.503	0.574	0.564	0.620	0.559	0.581	0.643	0.691	0.718	0.728	0.808
DCP15	.800	0.339	0.381	0.377	0.431	0.555	0.455	0.565	0.569	0.573	0.562	0.664
DCP16	.900	0.120	0.184	0.066	0.176	0.208	0.225	0.233	0.270	0.268	0.270	0.342
DCP17	.969	-0.019	0.005	0.005	0.016	-0.019	0.055	-0.022	0.014	0.010	0.015	0.027

AIRFOIL NLR 7223-62 STEADY FORCES AND MOMENTS

M = 0.705 Rn = 10.0 x 10^6 SOLID FLOOR AND CEILING

ALPHA		18.140	18.696	19.276	19.903
CN		1.068	1.138	1.180	1.199
CM		-0.115	-0.123	-0.136	-0.146
DCP 1	.010	2.527	2.659	2.721	2.643
DCP 2	.020	2.467	2.607	2.634	2.635
DCP 3	.030	2.855	2.692	2.630	2.598
DCP 4	.049	1.774	1.785	1.824	1.865
DCP 5	.074	1.661	1.724	1.741	1.789
DCP 6	.099	1.591	1.659	1.699	1.707
DCP 7	.149	1.480	1.577	1.642	1.596
DCP 8	.200	1.696	1.734	1.759	1.767
DCP 9	.250	1.774	1.787	1.818	1.802
DCP10	.300	1.506	1.613	1.617	1.637
DCP11	.399	1.101	1.361	1.427	1.404
DCP12	.501	0.913	1.079	1.155	1.182
DCP13	.600	0.883	1.003	1.050	1.056
DCP14	.701	0.854	0.843	0.879	0.961
DCP15	.800	0.717	0.699	0.706	0.754
DCP16	.900	0.381	0.297	0.373	0.411
DCP17	.968	-0.076	0.007	0.075	0.118

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.89	0.155	0.218	2.61	0.0	0.05	12093.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
75.2 (246.6)	14163 (295.8)	0.35E 07	-0.040	0.328	2.62	-0.00125	0.760	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.050	2.607	0	0.039	357	0.061	218	0.020	130	0.015	35	0.021	46	0.013	159	0.005	33	0.009	346
CN		0.139	0.169	359	0.005	282	0.008	163	0.005	232	0.002	229	0.004	68	0.002	161	0.017	10	0.002	34
CM		-0.024	0.010	300	0.001	46	0.001	331	0.002	50	0.001	4	0.001	268	0.001	79	0.005	202	0.000	359
DCP 1	.010	-0.482	1.327	346	0.024	343	0.014	158	0.012	229	0.017	274	0.008	338	0.013	10	0.028	323	0.017	31
DCP 2	.020	-0.311	0.909	349	0.032	282	0.007	299	0.006	355	0.001	355	0.010	67	0.003	284	0.027	345	0.013	36
DCP 3	.030	0.046	0.781	349	0.020	293	0.004	197	0.002	126	0.001	236	0.014	38	0.004	62	0.016	332	0.007	44
DCP 4	.049	0.008	0.633	349	0.010	310	0.012	146	0.007	308	0.006	197	0.005	207	0.004	62	0.017	343	0.002	13
DCP 5	.074	0.126	0.502	350	0.010	306	0.009	167	0.009	222	0.009	308	0.004	353	0.006	97	0.011	349	0.010	58
DCP 6	.099	0.350	0.426	352	0.004	8	0.011	146	0.003	325	0.008	241	0.005	9	0.004	101	0.009	339	0.014	12
DCP 7	.149	0.741	0.323	354	0.009	284	0.007	158	0.005	301	0.007	222	0.007	55	0.004	254	0.018	0	0.005	5
DCP 8	.200	0.231	0.242	358	0.006	1	0.018	154	0.007	91	0.010	331	0.006	43	0.004	81	0.014	332	0.009	20
DCP 9	.250	0.200	0.223	347	0.009	46	0.012	165	0.014	294	0.005	306	0.006	355	0.005	98	0.023	357	0.001	251
DCP10	.300	0.213	0.188	358	0.003	321	0.008	165	0.003	267	0.006	259	0.007	204	0.004	84	0.018	27	0.005	146
DCP11	.399	0.204	0.150	9	0.011	284	0.011	208	0.003	77	0.004	115	0.004	48	0.011	177	0.019	9	0.007	223
DCP12	.501	0.129	0.113	10	0.006	313	0.015	141	0.006	203	0.010	129	0.011	64	0.006	63	0.022	5	0.003	252
DCP13	.600	0.192	0.082	14	0.008	317	0.012	183	0.017	202	0.011	264	0.012	64	0.002	121	0.022	18	0.010	350
DCP14	.701	0.203	0.057	29	0.004	114	0.007	212	0.012	249	0.005	170	0.004	226	0.005	277	0.018	25	0.009	105
DCP15	.800	0.108	0.039	38	0.012	203	0.001	27	0.006	193	0.003	152	0.010	156	0.006	255	0.022	28	0.005	154
DCP16	.900	-0.059	0.015	85	0.005	239	0.010	110	0.008	334	0.008	62	0.010	87	0.004	350	0.010	10	0.004	56
DCP17	.969	0.023	0.014	135	0.010	235	0.004	111	0.008	230	0.017	250	0.012	342	0.023	186	0.021	6	0.012	286

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.89	0.162	0.210	2.61	0.0	2.45	12093.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
71.9 (235.8)	13205 (275.8)	0.34E 07	-0.034	0.540	5.03	-0.00113	0.665	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.449	2.609	0	0.039	357	0.062	220	0.015	130	0.018	357	0.022	33	0.014	127	0.004	193	0.010	331
CN		0.348	0.185	356	0.003	300	0.002	99	0.003	206	0.003	258	0.001	305	0.001	177	0.006	3	0.001	98
CM		-0.020	0.008	299	0.001	89	0.001	59	0.002	359	0.001	133	0.001	112	0.001	117	0.001	146	0.001	180
DCP 1	.010	0.998	1.269	345	0.028	32	0.013	18	0.008	206	0.017	194	0.014	78	0.011	80	0.022	356	0.007	169
DCP 2	.020	0.687	0.996	348	0.013	16	0.012	80	0.007	63	0.015	241	0.010	79	0.008	99	0.013	36	0.013	193
DCP 3	.030	0.944	0.841	348	0.010	16	0.010	32	0.002	12	0.007	205	0.007	52	0.008	169	0.014	39	0.009	146
DCP 4	.049	0.731	0.693	349	0.002	291	0.014	53	0.003	244	0.002	351	0.004	82	0.007	160	0.021	69	0.005	230
DCP 5	.074	0.727	0.561	349	0.006	320	0.006	122	0.005	69	0.009	260	0.003	117	0.009	151	0.008	13	0.006	147
DCP 6	.099	0.874	0.453	352	0.003	70	0.008	80	0.007	214	0.004	224	0.004	341	0.005	88	0.010	72	0.007	137
DCP 7	.149	0.627	0.349	351	0.007	291	0.015	85	0.008	340	0.007	226	0.000	46	0.001	139	0.013	17	0.011	139
DCP 8	.200	0.944	0.284	356	0.011	103	0.014	56	0.007	199	0.009	261	0.004	108	0.001	157	0.010	33	0.012	131
DCP 9	.250	0.460	0.236	355	0.007	307	0.008	165	0.008	299	0.002	245	0.010	159	0.009	177	0.002	161	0.004	244
DCP10	.300	0.457	0.203	358	0.007	300	0.009	157	0.008	314	0.002	145	0.007	289	0.005	164	0.004	7	0.008	102
DCP11	.399	0.391	0.164	5	0.006	268	0.004	139	0.009	227	0.002	215	0.007	326	0.006	164	0.007	319	0.005	230
DCP12	.501	0.269	0.116	6	0.004	342	0.004	331	0.005	194	0.005	209	0.002	246	0.004	27	0.015	24	0.010	315
DCP13	.600	0.301	0.087	10	0.004	119	0.006	258	0.004	15	0.007	218	0.004	205	0.009	160	0.012	337	0.004	287
DCP14	.701	0.. 5	0.064	23	0.008	291	0.004	60	0.005	86	0.008	325	0.003	313	0.011	305	0.005	355	0.001	333
DCP15	.800	0.149	0.041	24	0.009	277	0.003	207	0.009	161	0.008	318	0.005	42	0.008	183	0.010	327	0.003	104
DCP16	.900	-0.049	0.017	57	0.008	196	0.005	148	0.018	173	0.002	136	0.007	274	0.017	337	0.006	261	0.008	16
DCP17	.969	0.012	0.004	165	0.009	9	0.007	306	0.013	235	0.006	340	0.002	283	0.007	137	0.005	88	0.008	48

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.89	0.168	0.709	2.6C	0.0	4.95	12099.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
69.2 (227.1)	12334 (257.6)	0.92E 07	-0.032	0.778	7.59	-0.00164	0.931	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.950	2.692 0	0.061 4	0.061 218	0.021 122	0.018 11	0.026 33	0.012 151	0.007 122	0.010 0
CN		0.588	0.191 359	0.001 322	0.038 69	0.003 152	0.003 277	0.002 80	0.001 39	0.004 289	0.007 24
CM		-0.016	0.011 292	0.001 344	0.002 245	0.001 5	0.001 92	0.001 279	0.002 14	0.002 288	0.002 217
OCP 1	.010	2.474	1.257 345	0.024 39	0.012 134	0.015 126	0.016 243	0.002 335	0.031 19	0.050 285	0.021 3
OCP 2	.020	1.938	1.002 348	0.013 356	0.018 132	0.011 86	0.015 282	0.011 317	0.029 8	0.050 285	0.017 25
OCP 3	.030	1.981	0.874 349	0.015 20	0.018 109	0.007 99	0.002 270	0.005 51	0.012 16	0.035 297	0.012 344
OCP 4	.040	1.606	0.719 349	0.018 338	0.003 115	0.007 196	0.006 153	0.013 269	0.017 48	0.032 299	0.016 20
OCP 5	.074	1.442	0.570 349	0.014 304	0.006 97	0.009 224	0.008 291	0.008 348	0.020 24	0.029 296	0.006 50
OCP 6	.090	1.468	0.468 351	0.019 298	0.018 117	0.005 246	0.004 270	0.018 290	0.016 31	0.028 295	0.009 60
OCP 7	.149	1.075	0.361 353	0.015 299	0.013 353	0.004 58	0.010 328	0.003 349	0.012 19	0.036 291	0.011 321
OCP 8	.200	0.919	0.298 356	0.006 299	0.008 315	0.009 114	0.009 317	0.007 270	0.011 8	0.030 278	0.010 10
OCP 9	.250	0.756	0.248 359	0.005 58	0.005 117	0.005 13	0.009 182	0.034 324	0.012 54	0.009 56	0.008 58
OCP10	.300	0.721	0.201 1	0.004 40	0.013 39	0.007 45	0.007 352	0.005 37	0.003 337	0.007 206	0.005 30
OCP11	.399	0.604	0.171 9	0.005 117	0.021 87	0.004 26	0.011 265	0.003 172	0.013 226	0.005 150	0.008 354
OCP12	.501	0.417	0.131 8	0.005 167	0.009 53	0.005 170	0.001 273	0.013 118	0.001 166	0.006 47	0.004 45
OCP13	.600	0.412	0.099 14	0.006 56	0.015 60	0.004 144	0.006 147	0.008 114	0.003 349	0.005 89	0.008 30
OCP14	.701	0.372	0.067 33	0.005 356	0.008 51	0.007 155	0.003 196	0.012 49	0.009 158	0.008 189	0.016 11
OCP15	.800	0.192	0.045 41	0.007 32	0.005 209	0.006 136	0.011 292	0.003 139	0.009 183	0.005 110	0.004 36
OCP16	.900	-0.041	0.027 70	0.016 191	0.010 83	0.015 257	0.004 77	0.003 140	0.004 220	0.015 77	0.003 86
OCP17	.969	0.009	0.024 116	0.009 299	0.005 11	0.013 153	0.012 283	0.035 317	0.014 196	0.006 159	0.017 50

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.172	0.199	2.60	0.0	7.42	12099.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
67.9 (222.71	11893 (248.4)	0.32E 07	-0.021	1.009	10.0	-0.00139	0.770	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.412	2.605 0	0.066 0	0.066 223	0.022 127	0.021 20	0.028 41	0.012 157	0.007 133	0.010 344
CN		0.818	0.197 359	0.003 60	0.002 56	0.002 269	0.005 260	0.002 105	0.001 264	0.006 59	0.001 170
CM		-0.009	0.011 300	0.001 322	0.001 257	0.001 267	0.001 61	0.001 295	0.001 124	0.001 283	0.001 16
OCP 1	.010	3.471	1.269 346	0.052 35	0.043 312	0.041 218	0.007 257	0.006 146	0.014 128	0.020 351	0.004 125
OCP 2	.020	3.139	1.347 349	0.020 7	0.012 326	0.006 2	0.027 285	0.009 37	0.008 301	0.029 351	0.006 89
OCP 3	.030	3.019	0.990 349	0.015 313	0.004 298	0.007 354	0.006 262	0.009 99	0.005 113	0.028 19	0.001 267
OCP 4	.040	2.402	0.778 349	0.011 353	0.006 255	0.009 268	0.006 323	0.014 168	0.007 168	0.023 14	0.010 128
OCP 5	.074	2.156	0.596 349	0.015 8	0.002 195	0.003 219	0.002 123	0.004 348	0.011 114	0.020 35	0.006 76
OCP 6	.090	2.049	0.494 351	0.013 4	0.007 140	0.004 154	0.002 256	0.004 329	0.006 170	0.018 350	0.009 78
OCP 7	.149	1.591	0.362 353	0.016 7	0.005 92	0.007 295	0.015 250	0.006 91	0.010 278	0.021 37	0.006 77
OCP 8	.200	1.769	0.298 357	0.016 98	0.004 291	0.008 300	0.018 337	0.006 329	0.011 162	0.018 44	0.002 358
OCP 9	.250	1.065	0.242 358	0.004 123	0.005 155	0.008 190	0.006 290	0.009 123	0.007 36	0.009 92	0.009 345
OCP10	.300	0.977	0.209 1	0.004 192	0.004 351	0.005 252	0.005 96	0.005 118	0.003 144	0.004 346	0.003 297
OCP11	.399	0.892	0.165 8	0.005 342	0.005 43	0.008 296	0.005 226	0.010 112	0.004 289	0.011 83	0.004 278
OCP12	.501	0.571	0.137 13	0.006 259	0.009 154	0.004 321	0.010 268	0.008 320	0.002 207	0.011 134	0.000 39
OCP13	.600	0.514	0.104 17	0.007 187	0.011 48	0.004 244	0.004 242	0.004 234	0.005 279	0.010 158	0.000 288
OCP14	.701	0.493	0.073 33	0.008 135	0.003 81	0.006 140	0.005 215	0.007 172	0.003 134	0.008 158	0.009 160
OCP15	.800	0.336	0.040 43	0.004 161	0.002 60	0.009 101	0.004 247	0.004 185	0.005 308	0.006 242	0.007 186
OCP16	.900	-0.029	0.014 31	0.008 355	0.004 31	0.007 343	0.012 241	0.009 69	0.010 301	0.010 27	0.006 314
OCP17	.965	-0.014	0.005 230	0.009 96	0.006 221	0.009 137	0.001 196	0.012 110	0.005 333	0.010 90	0.012 113

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO.	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	22.98	0.174	0.197	2.56	0.0	14.86	12093.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TRP	EXT DAMP
67.3 (220.7)	11735 (245.1)	0.925 07	-0.191	1.612	17.46	0.00447	-2.622	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.862	2.558	0	0.101	6	0.081	234	0.036	124	0.010	4	0.025	91	0.018	155	0.004	12	0.012	355
CN		1.183	0.404	42	0.193	256	0.049	129	0.031	345	0.010	269	0.006	65	0.002	159	0.019	11	0.003	268
CM		-0.021	0.053	147	0.038	4	0.020	258	0.015	133	0.005	18	0.004	257	0.001	141	0.006	216	0.001	326
DCP 1	.010	5.407	1.725	72	0.781	15	0.352	321	0.266	224	0.174	138	0.094	53	0.079	327	0.094	280	0.038	176
DCP 2	.020	4.735	1.593	79	0.695	357	0.317	296	0.164	217	0.124	135	0.095	45	0.063	328	0.088	282	0.032	173
DCP 3	.030	4.470	1.526	71	0.673	353	0.272	226	0.162	142	0.123	65	0.077	336	0.060	215	0.084	205	0.033	12
DCP 4	.049	3.503	1.229	89	0.515	11	0.179	296	0.030	187	0.039	234	0.016	162	0.025	120	0.039	1	0.015	7
DCP 5	.074	2.981	1.122	81	0.421	344	0.128	238	0.061	125	0.013	271	0.012	75	0.005	267	0.023	316	0.007	114
DCP 6	.099	2.704	1.029	72	0.365	321	0.124	213	0.066	125	0.021	15	0.017	346	0.016	266	0.031	319	0.006	259
DCP 7	.149	2.157	0.861	56	0.319	282	0.109	141	0.088	97	0.035	355	0.032	330	0.030	228	0.028	279	0.021	87
DCP 8	.200	1.851	0.763	42	0.294	271	0.142	17	0.084	77	0.024	17	0.035	318	0.011	241	0.032	304	0.036	350
DCP 9	.250	1.615	0.696	37	0.291	266	0.135	16	0.086	15	0.095	360	0.026	325	0.081	129	0.054	107	0.027	244
DCP10	.300	1.446	0.646	28	0.276	266	0.126	136	0.085	26	0.052	286	0.033	211	0.022	140	0.035	35	0.026	313
DCP1	.399	1.188	0.467	26	0.189	229	0.110	126	0.080	6	0.053	265	0.029	175	0.039	79	0.050	13	0.026	276
DCP17	.501	0.864	0.357	18	0.157	212	0.103	106	0.074	339	0.035	236	0.025	136	0.009	36	0.013	9	0.021	206
DCP13	.600	0.688	0.286	17	0.144	203	0.088	92	0.071	324	0.327	271	0.022	112	0.023	305	0.013	0	0.016	157
DCP14	.701	0.542	0.223	10	0.133	193	0.078	74	0.074	303	0.017	162	0.023	67	0.016	286	0.015	42	0.007	125
DCP15	.800	0.331	0.171	351	0.103	171	0.066	47	0.059	296	0.023	175	0.010	46	0.008	274	0.019	56	0.010	66
DCP16	.900	0.098	0.141	326	0.073	160	0.046	68	0.038	278	0.017	135	0.015	10	0.003	295	0.010	17	0.009	24
DCP17	.949	0.010	0.079	330	0.042	188	0.025	30	0.025	277	0.008	318	0.038	26	0.004	2	0.015	28	0.007	153

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	22.96	0.173	0.199	2.54	0.0	17.37	12093.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TRP	EXT DAMP
67.6 (221.9)	11870 (247.9)	0.935 07	-0.256	1.907	19.49	0.00054	-0.799	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.374	2.518	3	0.056	31	0.031	176	0.027	11	0.018	293	0.021	78	0.027	115	0.004	269	0.011	302
CN		1.181	0.408	42	0.127	353	0.077	294	0.055	207	0.029	127	0.018	52	0.019	323	0.014	181	0.005	147
CM		-0.069	0.182	178	0.069	117	0.024	[illegible]	0.020	332	0.011	260	0.008	175	0.003	111	0.001	115	0.002	334
DCP 1	.010	6.250	1.976	134	0.587	130	0.337	105	0.171	88	0.160	78	0.163	46	0.111	15	0.147	315	0.043	340
DCP 2	.020	5.726	1.785	119	0.507	122	0.296	84	0.060	86	0.114	79	0.096	28	0.066	7	0.091	271	0.018	259
DCP 3	.030	5.570	1.655	110	0.295	83	0.203	32	0.095	317	0.007	268	0.018	157	0.015	292	0.032	217	0.007	136
DCP 4	.049	5.166	1.537	125	0.488	82	0.196	14	0.094	342	0.036	74	0.037	51	0.033	313	0.061	219	0.011	132
DCP 5	.074	2.620	1.024	113	0.366	63	0.166	356	0.088	315	0.009	175	0.021	12	0.017	263	0.061	196	0.013	169
DCP 6	.099	2.383	0.909	133	0.357	52	0.167	351	0.095	299	0.016	259	0.011	160	0.024	261	0.063	207	0.015	150
DCP 7	.149	1.956	0.770	77	0.272	46	0.218	330	0.161	275	0.068	216	0.016	200	0.039	238	0.063	177	0.038	133
DCP 8	.200	1.737	0.686	70	0.264	27	0.207	331	0.161	276	0.076	238	0.021	186	0.073	223	0.054	166	0.026	128
DCP 9	.250	1.566	0.637	59	0.251	8	0.171	315	0.158	266	0.096	190	0.372	159	0.348	123	0.363	95	0.038	39
DCP10	.300	1.472	0.563	62	0.229	358	0.154	298	0.125	239	0.057	178	0.066	125	0.035	75	0.038	63	0.015	356
DCP11	.399	1.290	0.494	45	0.227	346	0.121	290	0.115	211	0.047	169	0.070	123	0.035	60	0.037	47	0.032	291
DCP12	.501	0.990	0.451	38	0.208	335	0.135	271	0.107	196	0.066	172	0.041	76	0.032	7	0.024	332	0.026	231
DCP13	.600	0.811	0.385	29	0.186	318	0.116	261	0.103	178	0.054	111	0.050	36	0.043	316	0.025	299	0.035	208
DCP14	.701	0.675	0.343	18	0.165	297	0.113	241	0.097	154	0.068	85	0.063	9	0.032	295	0.025	243	0.029	161
DCP15	.800	0.499	0.287	3	0.154	285	0.095	214	0.081	130	0.056	57	0.068	336	0.036	257	0.016	201	0.021	111
DCP16	.900	0.279	0.193	6	0.109	270	0.093	214	0.069	112	0.046	46	0.060	322	0.019	198	0.018	195	0.010	64
DCP17	.965	0.095	0.098	7	0.061	281	0.022	236	0.033	135	0.019	18	0.018	337	0.007	68	0.016	99	0.006	327

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION NLR 1

TIMER MT	DRIVE MT	K	MACH NO	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.02	0.172	0.291	0.0	19.87	12099.0	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,NMAX	AERO DAMP	TRB	EXT DAMP
68.2 (223.9)	12099 (252.7)	0.925 07	-0.162	1.273	10.85	-0.01532	2.275	0.0

HARMONIC ANALYSIS

DATA TYPE	K/F	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		19.827	2.533 0	0.053 24	0.056 214	0.021 159	0.002 28	0.008 63	0.013 179	0.002 27	0.012 356
CN		0.900	0.194 74	0.048 119	0.033 126	0.026 91	0.002 236	0.003 85	0.007 125	0.010 351	0.003 225
CM		-0.101	0.047 237	0.005 304	0.007 252	0.006 253	0.001 179	0.002 241	0.002 287	0.004 190	0.001 47
DCP 1	.310	1.607	0.153 130	0.071 208	0.053 215	0.007 356	0.006 6	0.011 169	0.006 336	0.015 287	0.008 260
DCP 2	.020	1.555	0.124 106	0.060 200	0.043 197	0.020 123	0.018 185	0.036 265	0.036 294	0.018 211	0.009 249
DCP 3	.090	1.666	0.123 107	0.088 231	0.035 245	0.022 92	0.025 19	0.010 307	0.015 46	0.013 175	0.014 149
DCP 4	.060	2.004	0.614 148	0.216 91	0.063 169	0.026 119	0.023 97	0.029 98	0.026 87	0.011 296	0.015 149
DCP 5	.036	2.305	0.464 146	0.107 99	0.077 172	0.047 119	0.038 181	0.017 172	0.011 86	0.033 251	0.027 201
DCP 6	.090	1.645	0.272 115	0.120 81	0.058 151	0.019 129	0.017 229	0.039 246	0.011 242	0.002 12	0.006 291
DCP 7	.145	1.599	0.218 69	0.097 99	0.053 156	0.028 110	0.020 176	0.010 96	0.017 91	0.005 250	0.007 14
DCP 8	.200	1.272	0.216 81	0.151 131	0.072 163	0.012 166	0.022 215	0.011 145	0.013 211	0.016 232	0.016 160
DCP 9	.250	1.158	0.260 75	0.088 125	0.060 145	0.020 101	0.016 298	0.019 332	0.019 163	0.020 304	0.009 165
DCP10	.300	1.131	0.232 72	0.078 127	0.066 143	0.015 81	0.010 309	0.006 289	0.005 156	0.023 320	0.006 308
DCP11	.390	1.060	0.262 68	0.076 129	0.063 118	0.023 94	0.007 125	0.006 295	0.007 214	0.011 316	0.009 179
DCP12	.501	0.918	0.268 66	0.064 114	0.052 125	0.041 101	0.006 213	0.009 137	0.014 156	0.021 47	0.010 187
DCP13	.600	0.836	0.267 62	0.054 127	0.039 109	0.020 106	0.006 311	0.006 134	0.013 150	0.010 103	0.010 299
DCP14	.701	0.773	0.233 56	0.027 110	0.038 84	0.035 54	0.006 12	0.014 49	0.013 85	0.022 346	0.006 232
DCP15	.800	0.627	0.202 50	0.008 54	0.035 49	0.031 56	0.002 248	0.013 6	0.013 67	0.012 6	0.010 154
DCP16	.900	0.378	0.114 43	0.012 18	0.011 54	0.016 67	0.003 235	0.003 89	0.012 121	0.018 5	0.009 280
DCP17	.969	0.091	0.059 50	0.019 174	0.020 36	0.023 117	0.020 30	0.015 99	0.016 98	0.022 9	0.010 27

FORCED PITCHING OSCILLATION AIRSOFT NLR 1

TIMER MT	DRIVE MT	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	22.95	0.111	0.309	2.58	0.0	0.07	12095.1	29

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,NMAX	AERO DAMP	TRB	EXT DAMP
105.4 (345.9)	28776 (601	0.950E 07	-0.036	0.971	2.68	-0.00085	0.773	0.0

HARMONIC ANALYSIS

DATA TYPE	K/F	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		0.067	2.593 0	0.058 7	0.067 210	0.022 176	0.005 28	0.021 61	0.015 209	0.016 208	0.006 337
CN		0.118	0.219 356	0.032 292	0.032 163	0.021 248	0.000 44	0.022 167	0.003 266	0.009 175	0.002 231
CM		-0.017	0.007 308	0.001 315	0.002 273	0.000 97	0.001 177	0.001 332	0.001 79	0.001 21	0.000 31
DCP 1	.010	-0.010	1.608 347	0.013 8	0.015 156	0.006 180	0.005 180	0.006 17	0.006 265	0.015 159	0.007 277
DCP 2	.030	-0.349	1.171 349	0.021 295	0.020 214	0.005 278	0.003 260	0.013 11	0.001 77	0.015 175	0.003 320
DCP 3	.070	-0.051	0.949 349	0.021 283	0.007 164	0.006 206	0.002 251	0.006 19	0.002 259	0.006 200	0.003 3
DCP 4	.069	0.092	0.786 349	0.017 330	0.005 156	0.004 139	0.003 146	0.004 85	0.001 278	0.008 181	0.005 356
DCP 5	.036	0.217	0.621 350	0.013 302	0.007 146	0.003 108	0.004 175	0.001 79	0.002 185	0.005 158	0.003 298
DCP 6	.090	0.338	0.530 351	0.011 309	0.004 121	0.001 347	0.005 168	0.005 95	0.004 337	0.003 134	0.002 271
DCP 7	.140	0.272	0.508 351	0.012 277	0.006 183	0.002 111	0.005 80	0.005 11	0.004 336	0.006 170	0.004 298
DCP 8	.200	0.192	0.318 355	0.003 274	0.008 153	0.003 341	0.005 176	0.004 267	0.003 206	0.006 237	0.006 274
DCP 9	.250	0.165	0.271 353	0.003 21	0.006 54	0.003 171	0.002 200	0.005 183	0.001 3	0.007 116	0.008 175
DCP10	.300	0.128	0.231 355	0.000 300	0.001 82	0.006 269	0.004 197	0.005 164	0.005 255	0.006 75	0.002 240
DCP11	.399	0.176	0.196 350	0.003 308	0.001 262	0.006 257	0.005 49	0.005 196	0.007 269	0.007 104	0.003 2.2
DCP12	.501	0.117	0.165 1	0.006 133	0.006 97	0.002 176	0.003 218	0.005 157	0.003 325	0.002 221	0.005 177
DCP13	.600	0.150	0.127 6	0.007 123	0.003 188	0.002 195	0.006 302	0.003 175	0.002 137	0.006 268	0.002 127
DCP14	.701	0.199	0.071 10	0.002 167	0.002 71	0.003 247	0.000 222	0.004 155	0.001 247	0.003 113	0.005 209
DCP15	.800	0.206	0.062 15	0.001 171	0.002 197	0.002 339	0.003 343	0.003 137	0.002 263	0.005 178	0.002 252
DCP16	.900	-0.025	0.110 8	0.002 326	0.002 296	0.001 266	0.005 50	0.004 132	0.003 266	0.004 209	0.001 216
DCP17	.966	-0.033	0.013 175	0.003 148	0.004 176	0.003 269	0.000 336	0.004 171	0.002 264	0.003 234	0.002 310

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TIMER MZ	DRIVE MZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA,0	TEST POINT	CYCLES ANALYZED
0.0	22.96	0.113	0.303	2.60	0.0	2.53	12095.2	22

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TAU	FRT DAMP
103.1 (338.2)	27747. (579.5)	0.495 07	-0.321	0.568	4.92	-0.000085	0.705	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		2.495	2.597 0	0.062 5	0.006 229	0.020 139	0.013 26	0.026 38	0.013 174	0.010 206	0.009 343
CN		0.353	0.220 354	0.033 16	0.000 299	0.001 47	0.000 191	0.002 115	0.002 234	0.006 224	0.002 267
CM		-0.012	0.007 308	0.001 284	0.000 270	0.000 203	0.000 67	0.001 289	0.001 16	0.001 48	0.001 84
RFP 1	.010	1.045	1.447 346	0.029 11	0.004 316	0.006 52	0.001 337	0.007 71	0.007 290	0.011 202	0.002 313
RFP 2	.020	0.848	1.168 349	0.019 354	0.004 283	0.003 43	0.003 104	0.006 97	0.007 324	0.010 237	0.005 10
RFP 3	.030	0.949	0.995 349	0.019 337	0.002 269	0.004 63	0.002 74	0.005 116	0.007 303	0.010 218	0.002 130
RFP 4	.040	0.962	0.813 349	0.014 321	0.004 168	0.002 47	0.002 100	0.003 151	0.009 259	0.012 232	0.006 111
RFP 5	.074	0.915	0.648 350	0.009 344	0.004 237	0.001 331	0.002 275	0.003 111	0.009 246	0.008 224	0.006 287
RFP 6	.099	0.927	0.532 350	0.009 5	0.006 284	0.002 50	0.003 15	0.003 142	0.003 267	0.004 242	0.001 218
RFP 7	.149	0.663	0.410 351	0.007 311	0.007 161	0.005 184	0.009 111	0.003 297	0.001 191	0.005 242	0.004 338
RFP 8	.200	0.551	0.335 354	0.005 348	0.012 313	0.007 73	0.002 64	0.002 143	0.006 323	0.010 317	0.006 206
RFP 9	.250	0.459	0.284 357	0.007 358	0.003 181	0.004 20	0.001 305	0.005 86	0.007 102	0.006 175	0.001 97
RFP10	.300	0.447	0.239 356	0.003 47	0.001 338	0.002 1	0.004 236	0.003 44	0.007 127	0.010 219	0.002 225
RFP11	.399	0.378	0.198 359	0.002 21	0.002 356	0.000 145	0.003 282	0.005 86	0.006 232	0.011 220	0.002 234
RFP12	.501	0.265	0.147 3	0.002 61	0.003 123	0.002 56	0.001 47	0.004 141	0.001 297	0.008 256	0.003 276
RFP13	.600	0.268	0.108 7	0.005 129	0.001 288	0.002 22	0.003 172	0.004 189	0.004 202	0.005 224	0.002 225
RFP14	.701	0.274	0.077 7	0.005 51	0.005 134	0.002 67	0.002 336	0.003 113	0.003 183	0.006 198	0.005 284
RFP15	.800	0.330	0.043 10	0.001 144	0.001 287	0.002 6	0.001 21	0.005 116	0.003 228	0.003 190	0.006 277
RFP16	.900	-0.067	0.013 37	0.003 42	0.003 19	0.003 257	0.006 73	0.008 72	0.001 45	0.009 147	0.003 208
RFP17	.949	-0.044	0.014 212	0.003 54	0.006 257	0.007 50	0.008 247	0.005 236	0.001 317	0.006 238	0.001 293

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TIMER MZ	DRIVE MZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA,0	TEST POINT	CYCLES ANALYZED
0.0	22.98	0.116	0.297	2.55	0.0	4.99	12095.1	22

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TAU	FRT DAMP
100.8 (330.6)	26665. (556.9)	0.485 07	-0.317	0.541	7.53	-0.001??	0.835	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		4.984	2.591 0	0.062 12	0.005 219	0.022 139	0.013 15	0.025 68	0.021 168	0.013 222	0.011 260
CN		0.635	0.224 355	0.027 12	0.002 231	0.021 281	0.020 293	0.003 111	0.003 201	0.007 327	0.001 287
CM		-0.007	0.008 333	0.001 278	0.001 73	0.001 115	0.001 187	0.001 322	0.001 13	0.003 160	0.000 188
RFP 1	.010	2.039	1.476 346	0.021 337	0.014 138	0.007 177	0.005 196	0.007 51	0.002 342	0.013 172	0.004 227
RFP 2	.020	2.140	1.188 349	0.017 320	0.010 162	0.005 94	0.009 270	0.009 41	0.002 320	0.010 181	0.006 284
RFP 3	.030	2.365	1.001 349	0.010 12	0.016 151	0.006 110	0.006 185	0.009 11	0.003 203	0.002 167	0.000 237
RFP 4	.040	1.867	0.810 353	0.013 342	0.005 135	0.005 184	0.006 191	0.005 96	0.006 262	0.006 196	0.003 195
RFP 5	.076	1.661	0.650 353	0.013 345	0.011 145	0.006 192	0.006 270	0.007 94	0.005 263	0.006 247	0.003 226
RFP 6	.099	1.565	0.551 351	0.012 340	0.012 99	0.007 203	0.006 279	0.006 116	0.007 43	0.006 186	0.002 178
RFP 7	.149	1.135	0.415 351	0.005 11	0.012 198	0.005 7	0.005 145	0.005 125	0.006 337	0.005 165	0.002 82
RFP 8	.200	0.932	0.347 355	0.006 17	0.005 161	0.007 140	0.005 256	0.005 126	0.006 14	0.002 153	0.000 174
RFP 9	.250	0.776	0.286 355	0.006 11	0.012 116	0.006 251	0.002 288	0.003 68	0.008 316	0.003 132	0.006 77
RFP10	.300	0.713	0.243 356	0.011 56	0.005 208	0.001 91	0.002 213	0.001 105	0.006 318	0.006 218	0.006 265
RFP11	.350	0.604	0.191 0	0.006 11	0.007 283	0.001 177	0.004 230	0.005 130	0.007 316	0.009 223	0.002 177
RFP12	.501	0.431	0.149 2	0.006 49	0.012 188	0.006 316	0.006 79	0.009 91	0.006 163	0.008 206	0.004 26
RFP13	.600	0.306	0.113 6	0.008 60	0.013 332	0.005 118	0.007 56	0.003 236	0.000 108	0.013 236	0.002 262
RFP14	.701	0.282	0.077 11	0.009 9	0.006 266	0.006 332	0.006 330	0.001 26	0.005 183	0.011 226	0.003 255
RFP15	.801	0.183	0.048 18	0.007 6	0.006 266	0.005 219	0.002 337	0.003 14	0.006 203	0.009 168	0.003 185
RFP16	.900	-0.054	0.018 39	0.006 47	0.006 216	0.005 220	0.002 16	0.008 266	0.001 117	0.010 161	0.003 237
RFP17	.949	-0.059	0.007 146	0.008 135	0.003 231	0.008 333	0.002 3	0.008 69	0.007 337	0.012 3	0.006 81

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

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ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.96	0.117	0.294	2.61	0.0	7.48	12095.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TRP	EXT DAMP
99.6 (326.6)	26095. (545.0)	0.48E 07	-0.016	1.069	10.12	-0.00125	1.006	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.477	2.607	0	0.062	5	0.047	231	0.024	129	0.023	21	0.019	102	0.011	175	0.026	174	0.010	263
CN		0.853	0.221	356	0.028	38	0.007	358	0.002	267	0.002	178	0.002	157	0.003	316	0.008	312	0.001	261
CM		-0.002	0.009	299	0.001	270	0.002	104	0.000	96	0.001	350	0.001	337	0.001	107	0.004	358	0.001	101
DCP 1	.010	4.161	1.938	346	0.120	50	0.056	318	0.002	183	0.013	301	0.008	208	0.016	89	0.026	312	0.005	74
DCP 2	.020	3.644	1.286	350	0.031	5	0.016	314	0.003	61	0.007	280	0.010	59	0.015	86	0.040	326	0.007	79
DCP 3	.030	3.178	1.021	349	0.026	324	0.016	305	0.005	120	0.014	309	0.006	34	0.011	65	0.020	314	0.003	96
DCP 4	.049	2.805	0.866	359	0.019	352	0.002	237	0.010	212	0.003	239	0.006	299	0.007	20	0.025	329	0.010	110
DCP 5	.074	2.406	0.675	350	0.014	4	0.001	267	0.014	178	0.002	76	0.000	218	0.004	31	0.018	311	0.006	98
DCP 6	.099	2.156	0.560	351	0.011	0	0.001	287	0.006	168	0.002	306	0.001	252	0.003	43	0.020	319	0.009	66
DCP 7	.145	1.804	0.419	352	0.011	4	0.006	344	0.006	298	0.004	293	0.005	50	0.006	59	0.017	322	0.006	45
DCP 8	.200	1.592	0.331	345	0.012	27	0.006	170	0.003	249	0.006	35	0.007	199	0.008	66	0.022	330	0.009	112
DCP 9	.250	1.089	0.283	356	0.009	61	0.009	13	0.005	239	0.004	165	0.005	167	0.002	287	0.011	179	0.003	227
DCP10	.300	0.984	0.216	356	0.007	57	0.005	37	0.002	241	0.002	104	0.003	264	0.007	276	0.010	194	0.006	220
DCP11	.399	0.910	0.189	3	0.006	23	0.011	7	0.002	277	0.003	119	0.001	136	0.006	307	0.018	191	0.015	254
DCP12	.501	0.597	0.143	4	0.007	54	0.009	342	0.003	321	0.005	177	0.004	82	0.002	307	0.012	195	0.006	274
DCP13	.600	0.509	0.109	11	0.009	49	0.010	349	0.003	346	0.007	169	0.003	189	0.009	314	0.010	180	0.003	243
DCP14	.701	0.442	0.079	18	0.007	58	0.009	358	0.004	277	0.002	307	0.005	175	0.006	286	0.010	181	0.001	256
DCP15	.800	0.229	0.044	29	0.008	94	0.006	6	0.007	262	0.006	168	0.001	201	0.004	338	0.015	173	0.003	269
DCP16	.900	-0.040	0.028	29	0.003	332	0.009	68	0.002	119	0.004	196	0.008	162	0.006	247	0.018	172	0.003	324
DCP17	.969	-0.063	0.006	94	0.007	97	0.008	350	0.006	131	0.006	299	0.005	320	0.007	279	0.019	215	0.001	349

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.99	0.118	0.293	2.60	0.0	9.94	12099.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TRP	EXT DAMP
99.3 (325.9)	26037. (543.8)	0.48E 07	-0.008	1.270	12.64	-0.00139	1.048	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.938	2.604	0	0.068	14	0.069	229	0.022	110	0.027	12	0.011	70	0.014	149	0.019	102	0.004	344
CN		1.069	0.195	2	0.018	3	0.006	257	0.001	227	0.001	356	0.002	147	0.001	66	0.017	75	0.001	131
CM		0.005	0.011	307	0.003	219	0.001	108	0.001	139	0.000	144	0.001	7	0.000	62	0.003	272	0.001	324
DCP 1	.010	5.685	1.422	351	0.287	269	0.169	161	0.027	165	0.028	135	0.012	111	0.012	347	0.019	257	0.006	105
DCP 2	.020	4.986	0.986	352	0.079	44	0.020	338	0.005	238	0.001	71	0.002	319	0.006	89	0.016	332	0.001	162
DCP 3	.030	4.193	0.965	351	0.061	3	0.007	266	0.002	151	0.001	121	0.006	47	0.003	149	0.008	322	0.002	210
DCP 4	.049	3.642	0.747	356	0.068	20	0.007	289	0.002	72	0.003	330	0.007	48	0.005	321	0.002	344	0.003	96
DCP 5	.074	3.071	0.595	354	0.035	17	0.008	285	0.002	151	0.002	26	0.008	70	0.005	57	0.015	74	0.004	350
DCP 6	.099	2.697	0.493	356	0.031	19	0.010	279	0.006	181	0.005	146	0.004	48	0.006	337	0.006	340	0.002	309
DCP 7	.149	2.015	0.377	357	0.028	355	0.011	271	0.001	229	0.004	297	0.003	188	0.007	92	0.007	325	0.005	15
DCP 8	.200	1.633	0.307	1	0.019	349	0.008	301	0.002	198	0.005	248	0.007	107	0.001	97	0.007	339	0.003	337
DCP 9	.250	1.373	0.269	1	0.019	0	0.017	282	0.004	198	0.001	305	0.002	223	0.004	76	0.011	67	0.004	211
DCP10	.300	1.216	0.209	1	0.021	12	0.006	275	0.001	90	0.005	58	0.002	337	0.003	147	0.012	56	0.004	6
DCP11	.399	0.998	0.164	8	0.019	19	0.009	247	0.002	339	0.004	72	0.003	139	0.001	299	0.012	80	0.001	108
DCP12	.501	0.734	0.124	16	0.020	17	0.005	269	0.002	101	0.002	229	0.004	142	0.005	64	0.007	86	0.004	184
DCP13	.600	0.634	0.086	24	0.019	8	0.001	259	0.002	103	0.002	3	0.003	192	0.003	313	0.010	92	0.004	126
DCP14	.701	0.495	0.051	37	0.015	14	0.006	266	0.005	281	0.006	2	0.002	147	0.001	103	0.009	88	0.004	117
DCP15	.800	0.268	0.036	43	0.008	17	0.009	279	0.006	278	0.005	36	0.003	249	0.003	308	0.011	96	0.003	75
DCP16	.900	-0.025	0.027	48	0.013	16	0.001	291	0.002	70	0.009	251	0.006	185	0.007	299	0.011	91	0.006	199
DCP17	.965	-0.060	0.010	14	0.002	34	0.005	277	0.004	7	0.004	171	0.004	34	0.008	64	0.013	86	0.004	242

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMER HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.111	0.337	2.56	0.0	12.39	12007.1	29

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAB	EXT DAMP
104.8 (343.9)	28412. (593.4)	0.490 07	-0.103	1.355	14.76	0.78859	-0.079	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		12.330	2.545 0	0.081 30	0.011 177	0.018 341	0.044 212	0.017 4	0.009 283	0.006 131	0.006 296
CN		1.099	0.172 63	0.066 341	0.020 184	0.015 110	0.013 47	0.017 350	0.010 277	0.016 289	0.006 195
CM		-0.014	0.032 190	0.029 59	0.014 321	0.008 275	0.007 199	0.014 196	0.006 60	0.009 338	0.001 229
DCP 1	.010	4.203	0.860 112	0.864 58	0.339 23	0.211 345	0.125 255	0.101 183	0.044 137	0.046 80	0.030 68
DCP 2	.020	4.287	0.781 144	0.828 75	0.472 72	0.363 336	0.277 291	0.157 243	0.092 222	0.082 211	0.045 155
DCP 3	.030	3.772	0.908 146	0.951 67	0.525 348	0.163 263	0.165 303	0.134 252	0.088 219	0.077 191	0.071 141
DCP 4	.040	3.608	0.389 94	0.329 40	0.093 320	0.054 281	0.055 212	0.016 127	0.015 60	0.016 300	0.006 330
DCP 5	.074	2.562	0.372 104	0.313 36	0.081 336	0.031 274	0.044 189	0.032 81	0.017 350	0.017 281	0.023 327
DCP 6	.099	2.407	0.367 174	0.288 29	0.078 284	0.023 264	0.042 191	0.036 78	0.024 329	0.017 271	0.016 299
DCP 7	.149	1.983	0.316 95	0.236 15	0.067 269	0.019 266	0.038 184	0.032 77	0.017 316	0.018 279	0.006 9
DCP 8	.200	1.665	0.290 77	0.194 357	0.058 242	0.018 196	0.035 147	0.026 49	0.017 338	0.014 291	0.010 261
DCP 9	.250	1.491	0.321 53	0.199 327	0.087 225	0.026 175	0.043 110	0.037 31	0.030 315	0.021 267	0.021 288
DCP10	.300	1.306	0.327 42	0.202 317	0.113 218	0.029 164	0.036 92	0.055 29	0.043 318	0.036 250	0.024 185
DCP11	.399	1.077	0.274 38	0.154 297	0.077 199	0.040 150	0.059 91	0.067 9	0.041 293	0.029 226	0.018 175
DCP12	.401	0.824	0.199 35	0.114 271	0.066 158	0.046 117	0.056 64	0.050 333	0.041 267	0.034 199	0.019 190
DCP13	.600	0.671	0.141 30	0.091 254	0.071 138	0.043 83	0.045 12	0.038 297	0.031 255	0.020 176	0.011 97
DCP14	.701	0.514	0.102 40	0.081 237	0.070 119	0.038 59	0.040 345	0.017 281	0.015 225	0.014 162	0.012 53
DCP15	.800	0.312	0.101 15	0.089 232	0.046 114	0.027 70	0.016 351	0.006 288	0.012 236	0.006 96	0.007 350
DCP16	.900	0.329	0.081 347	0.051 204	0.014 95	0.019 47	0.019 294	0.007 276	0.011 223	0.019 138	0.027 18
DCP17	.965	-0.019	0.053 339	0.019 194	0.005 62	0.011 45	0.012 331	0.011 258	0.013 170	0.006 130	0.009 27

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMER HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.115	0.299	2.50	0.0	14.81	12007.2	29

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAB	EXT DAMP
101.7 (333.5)	27100. (566.0)	0.485 07	-0.150	1.498	15.90	-0.00946	0.178	0.1

HARMONIC ANALYSIS

DATA TYPE	K/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		14.800	2.466 0	0.068 37	0.048 162	0.034 100	0.005 176	0.054 6	0.000 000	0.010 131	0.004 286
CN		1.137	0.193 67	0.085 81	0.036 28	0.043 338	0.018 285	0.017 278	0.013 261	0.013 261	0.006 240
CM		-0.046	0.065 183	0.019 141	0.017 134	0.014 113	0.006 95	0.006 54	0.006 34	0.003 18	0.000 287
DCP 1	.010	4.733	1.488 140	0.746 158	0.435 161	0.230 160	0.172 130	0.196 148	0.087 101	0.068 158	0.003 185
DCP 2	.020	3.873	1.451 173	0.687 156	0.472 160	0.270 167	0.213 191	0.170 198	0.121 182	0.084 215	0.043 195
DCP 3	.030	3.336	1.630 164	0.769 153	0.390 166	0.157 166	0.182 191	0.095 198	0.115 206	0.079 214	0.072 216
DCP 4	.040	3.618	1.788 154	0.766 123	0.197 138	0.131 82	0.065 69	0.080 44	0.061 25	0.027 330	0.025 310
DCP 5	.074	2.860	0.745 151	0.305 114	0.152 95	0.092 64	0.076 36	0.063 28	0.038 341	0.025 311	0.026 287
DCP 6	.099	2.595	0.696 144	0.267 109	0.133 82	0.072 57	0.021 15	0.039 24	0.027 346	0.015 302	0.019 304
DCP 7	.149	1.962	0.536 125	0.162 101	0.090 73	0.049 38	0.027 349	0.031 16	0.023 357	0.013 270	0.014 229
DCP 8	.200	1.601	0.419 106	0.157 87	0.121 60	0.076 8	0.039 334	0.036 299	0.017 311	0.014 287	0.038 306
DCP 9	.250	1.480	0.383 93	0.201 77	0.129 38	0.120 0	0.053 340	0.051 331	0.029 339	0.023 287	0.020 284
DCP10	.300	1.350	0.375 79	0.212 61	0.126 19	0.133 356	0.056 329	0.050 311	0.031 276	0.021 275	0.017 272
DCP11	.399	1.161	0.278 63	0.159 58	0.076 17	0.110 347	0.060 315	0.065 277	0.036 277	0.021 278	0.018 288
DCP12	.501	0.929	0.230 42	0.103 41	0.068 351	0.088 326	0.038 282	0.049 248	0.023 233	0.026 236	0.018 267
DCP13	.600	0.761	0.211 28	0.058 3	0.063 316	0.078 296	0.035 258	0.060 243	0.034 227	0.018 207	0.012 171
DCP14	.701	0.618	0.196 17	0.042 336	0.061 331	0.060 270	0.032 246	0.042 229	0.024 214	0.021 200	0.013 165
DCP15	.800	0.619	0.199 6	0.060 327	0.051 298	0.034 271	0.032 266	0.022 221	0.018 194	0.011 200	0.006 89
DCP16	.900	0.125	0.128 356	0.038 327	0.027 337	0.034 295	0.018 270	0.032 181	0.011 165	0.020 92	0.009 282
DCP17	.965	0.022	0.066 345	0.019 19	0.017 337	0.028 329	0.015 179	0.011 173	0.010 83	0.012 298	0.007 326

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	22.98	0.117	0.294	2.91	0	17.39	12097.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TAB	EXT DAMP
99.8 (327.6)	26267. (548.6)	0.486 07	-0.162	1.284	17.65	-0.00596	4.839	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.391	2.509	0	0.055	30	0.044	212	0.015	154	0.026	21	0.013	21	0.009	178	0.012	31	0.008	2
CN		1.009	0.190	89	0.052	85	0.013	115	0.009	48	0.003	350	0.005	3	0.003	137	0.011	36	0.003	337
CM		-0.086	0.048	231	0.016	240	0.007	267	0.003	235	0.002	173	0.003	188	0.002	330	0.004	202	0.001	217
DCP 1	.010	3.795	0.903	177	0.163	215	0.127	237	0.073	309	0.049	262	0.017	355	0.015	139	0.031	32	0.001	16
DCP 2	.020	3.492	0.824	179	0.093	209	0.119	252	0.030	271	0.015	306	0.034	231	0.023	226	0.006	18	0.003	267
DCP 3	.030	3.297	0.791	187	0.096	176	0.096	232	0.016	242	0.018	307	0.042	280	0.014	294	0.009	259	0.014	211
DCP 4	.049	2.306	0.536	187	0.086	214	0.055	272	0.021	342	0.006	206	0.010	266	0.009	14	0.007	50	0.006	314
DCP 5	.074	1.759	0.397	139	0.057	222	0.036	298	0.022	357	0.020	162	0.008	216	0.003	125	0.012	98	0.003	349
DCP 6	.099	1.604	0.218	111	0.029	169	0.023	274	0.026	355	0.020	165	0.005	165	0.007	134	0.007	174	0.004	283
DCP 7	.149	1.415	0.208	82	0.050	112	0.018	268	0.007	358	0.007	216	0.015	167	0.009	185	0.011	166	0.014	250
DCP 8	.200	1.343	0.218	93	0.062	107	0.019	350	0.003	359	0.003	153	0.013	225	0.005	181	0.009	41	0.005	119
DCP 9	.250	1.275	0.260	93	0.076	105	0.023	136	0.018	81	0.011	125	0.009	86	0.012	32	0.007	349	0.011	287
DCP10	.300	1.219	0.254	83	0.091	101	0.033	137	0.018	124	0.006	167	0.024	344	0.010	38	0.010	68	0.005	311
DCP11	.399	1.128	0.269	93	0.097	87	0.037	137	0.019	112	0.005	91	0.012	43	0.009	28	0.016	28	0.012	318
DCP12	.501	0.969	0.245	78	0.094	72	0.046	118	0.012	79	0.012	1	0.012	60	0.002	290	0.013	77	0.002	296
DCP13	.600	0.837	0.253	73	0.083	60	0.038	111	0.012	54	0.012	18	0.015	347	0.009	263	0.016	50	0.006	212
DCP14	.701	0.739	0.218	63	0.071	58	0.037	99	0.011	358	0.016	3	0.011	3	0.006	181	0.020	50	0.005	132
DCP15	.800	0.509	0.179	47	0.040	61	0.031	74	0.023	65	0.014	257	0.018	347	0.004	139	0.017	13	0.019	48
DCP16	.900	0.257	0.114	54	0.036	63	0.013	56	0.017	344	0.013	8	0.004	333	0.007	174	0.025	344	0.007	10
DCP17	.969	0.077	0.044	70	0.023	49	0.011	48	0.011	74	0.003	343	0.007	44	0.003	47	0.013	30	0.004	309

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	22.94	0.118	0.292	2.94	0.0	19.80	12097.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TAB	EXT DAMP
99.1 (325.1)	25937. (541.7)	0.485 07	-0.160	1.289	17.65	-0.00596	4.758	0.7

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.802	2.541	0	0.070	14	0.050	228	0.015	96	0.033	26	0.006	294	0.011	165	0.021	147	0.011	15
CN		1.071	0.179	117	0.030	214	0.013	123	0.021	211	0.014	276	0.008	126	0.008	167	0.015	166	0.007	290
CM		-0.108	0.039	243	0.006	332	0.003	197	0.006	355	0.004	42	0.002	317	0.001	2	0.005	342	0.001	89
DCP 1	.010	2.606	1.048	150	0.062	336	0.068	34	0.030	311	0.065	4	0.013	162	0.031	321	0.030	256	0.037	30
DCP 2	.020	2.005	0.346	168	0.173	304	0.077	55	0.035	310	0.040	79	0.063	226	0.022	238	0.028	322	0.030	40
DCP 3	.030	1.946	0.191	122	0.039	233	0.008	77	0.020	286	0.012	89	0.009	188	0.009	114	0.013	275	0.009	68
DCP 4	.049	2.779	0.711	176	0.115	261	0.036	181	0.023	283	0.030	265	0.015	4	0.023	178	0.039	285	0.018	234
DCP 5	.074	2.237	0.450	165	0.129	274	0.032	142	0.027	233	0.032	276	0.013	27	0.027	182	0.023	297	0.014	191
DCP 6	.099	1.982	0.255	145	0.089	272	0.017	114	0.035	211	0.027	293	0.021	92	0.021	104	0.027	289	0.038	181
DCP 7	.149	1.703	0.174	115	0.027	191	0.013	91	0.021	217	0.028	293	0.002	231	0.006	161	0.002	6	0.020	290
DCP 8	.200	1.602	0.217	132	0.047	145	0.008	179	0.017	191	0.033	306	0.012	91	0.003	173	0.011	318	0.008	328
DCP 9	.250	1.525	0.210	125	0.064	242	0.035	336	0.032	268	0.021	348	0.009	93	0.021	131	0.036	157	0.024	216
DCP10	.300	1.267	0.212	116	0.045	217	0.008	228	0.030	246	0.023	331	0.013	131	0.015	120	0.036	151	0.004	224
DCP11	.399	1.168	0.231	111	0.062	208	0.013	237	0.033	241	0.029	332	0.012	118	0.011	126	0.035	152	0.018	244
DCP12	.501	1.023	0.228	104	0.050	194	0.006	158	0.033	217	0.024	268	0.016	139	0.006	171	0.026	133	0.019	189
DCP13	.600	0.915	0.223	98	0.049	182	0.006	158	0.033	212	0.029	261	0.018	139	0.007	205	0.015	136	0.010	150
DCP14	.701	0.822	0.197	89	0.022	168	0.007	100	0.031	186	0.029	218	0.010	153	0.003	184	0.008	184	0.010	323
DCP15	.800	0.651	0.154	75	0.010	95	0.011	42	0.032	157	0.023	195	0.007	129	0.008	197	0.023	210	0.017	308
DCP16	.900	0.277	0.100	63	0.011	103	0.004	242	0.024	146	0.014	188	0.005	112	0.006	181	0.025	164	0.005	106
DCP17	.969	0.073	0.037	86	0.010	150	0.006	247	0.007	44	0.009	14	0.004	298	0.009	194	0.016	162	0.002	169

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.45	0.216	0.314	2.82	0.0	0.10	12099.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
107.2 (351.6)	29978. (626.1)	0.51E 07	-0.026	0.286	3.00	-0.00082	0.725	0.8

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.102	2.821 0	0.079 358	0.091 262	0.006 127	0.029 85	0.024 51	0.015 186	0.011 170	0.011 356
CN		0.102	0.190 2	0.003 9	0.005 8	0.005 327	0.002 197	0.002 41	0.002 211	0.005 148	0.003 258
CM		-0.013	0.013 293	0.001 288	0.001 254	0.002 159	0.000 110	0.001 295	0.001 102	0.001 337	0.001 86
DCP 1	.010	-0.489	1.350 344	0.042 353	0.012 187	0.007 330	0.026 164	0.021 349	0.008 162	0.014 74	0.005 176
DCP 2	.020	-0.281	1.020 350	0.023 292	0.020 319	0.004 328	0.005 203	0.005 339	0.011 140	0.010 130	0.003 34
DCP 3	.030	-0.069	0.857 349	0.021 301	0.014 309	0.006 177	0.008 217	0.004 3	0.010 164	0.004 71	0.005 28
DCP 4	.049	0.145	0.697 350	0.013 336	0.016 340	0.010 199	0.007 176	0.002 210	0.007 178	0.001 148	0.006 6
DCP 5	.074	0.244	0.562 351	0.010 350	0.009 321	0.007 177	0.009 141	0.001 285	0.002 93	0.002 40	0.005 23
DCP 6	.099	0.319	0.484 352	0.009 1	0.010 336	0.006 197	0.006 149	0.002 227	0.005 149	0.004 91	0.003 120
DCP 7	.149	0.228	0.360 355	0.006 344	0.008 337	0.003 181	0.002 266	0.004 72	0.006 189	0.006 132	0.003 233
DCP 8	.200	0.167	0.286 3	0.008 347	0.004 85	0.006 7	0.011 178	0.005 294	0.003 214	0.007 124	0.004 166
DCP 9	.250	0.143	0.250 2	0.002 178	0.008 346	0.008 304	0.005 72	0.007 37	0.004 150	0.002 117	0.002 168
DCP10	.300	0.153	0.210 2	0.004 352	0.010 351	0.003 340	0.002 207	0.009 6	0.003 174	0.007 138	0.006 201
DCP11	.399	0.137	0.170 12	0.006 77	0.012 13	0.009 317	0.005 247	0.004 18	0.004 208	0.006 192	0.004 244
DCP12	.501	0.098	0.131 19	0.002 20	0.005 64	0.005 326	0.009 172	0.001 317	0.001 303	0.007 176	0.006 298
DCP13	.600	0.100	0.104 27	0.003 182	0.004 326	0.007 308	0.004 254	0.007 66	0.002 249	0.004 146	0.005 233
DCP14	.701	0.183	0.069 34	0.001 182	0.006 39	0.005 16	0.003 331	0.007 193	0.000 62	0.009 157	0.004 295
DCP15	.800	0.075	0.046 46	0.007 26	0.003 89	0.008 352	0.003 263	0.003 104	0.004 281	0.004 173	0.003 212
DCP16	.900	-0.075	0.024 74	0.004 124	0.005 132	0.008 286	0.002 87	0.004 164	0.003 241	0.007 147	0.007 243
DCP17	.969	-0.034	0.012 159	0.001 109	0.001 5	0.021 358	0.004 333	0.007 35	0.006 293	0.006 87	0.009 322

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.46	0.222	0.306	2.75	0.0	2.49	12099.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
104.1 (341.7)	28561. (596.5)	0.50E 07	-0.022	0.515	5.14	-0.00088	0.758	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.488	2.754 0	0.070 28	0.095 240	0.017 305	0.031 26	0.023 44	0.022 175	0.017 263	0.015 338
CN		0.328	0.191 1	0.002 92	0.003 342	0.009 336	0.001 274	0.003 4	0.002 192	0.004 350	0.001 278
CM		-0.008	0.013 292	0.001 33	0.001 190	0.003 161	0.001 98	0.001 143	0.000 53	0.002 193	0.000 15
DCP 1	.010	0.999	1.302 341	0.032 34	0.023 38	0.013 347	0.012 68	0.019 336	0.004 47	0.003 38	0.005 69
DCP 2	.020	0.868	1.042 348	0.019 17	0.010 269	0.008 308	0.004 161	0.006 42	0.013 91	0.008 253	0.005 349
DCP 3	.030	0.912	0.886 348	0.013 17	0.007 265	0.005 340	0.001 141	0.003 38	0.006 99	0.006 233	0.002 234
DCP 4	.049	0.961	0.717 349	0.009 61	0.008 270	0.004 323	0.003 148	0.010 123	0.005 135	0.005 321	0.006 357
DCP 5	.074	0.906	0.575 350	0.009 38	0.005 221	0.001 243	0.001 262	0.004 83	0.004 68	0.003 53	0.002 4
DCP 6	.099	0.882	0.474 352	0.014 51	0.008 297	0.008 253	0.004 156	0.001 36	0.006 60	0.004 302	0.003 81
DCP 7	.149	0.647	0.357 355	0.007 55	0.004 91	0.007 268	0.002 91	0.004 21	0.006 97	0.006 176	0.004 307
DCP 8	.200	0.515	0.296 1	0.010 84	0.004 214	0.005 284	0.006 48	0.001 95	0.008 92	0.006 309	0.005 110
DCP 9	.250	0.430	0.249 0	0.003 133	0.003 4	0.016 330	0.002 253	0.007 1	0.011 180	0.005 238	0.005 297
DCP10	.300	0.410	0.207 3	0.005 230	0.005 291	0.010 344	0.003 129	0.002 307	0.006 213	0.008 302	0.004 326
DCP11	.399	0.331	0.165 14	0.001 93	0.009 16	0.015 350	0.010 286	0.005 66	0.013 235	0.009 2	0.004 208
DCP12	.501	0.244	0.131 18	0.007 80	0.010 286	0.015 348	0.002 44	0.007 43	0.007 263	0.005 323	0.001 217
DCP13	.600	0.209	0.106 23	0.010 90	0.001 198	0.011 358	0.004 226	0.002 327	0.001 193	0.001 285	0.003 179
DCP14	.701	0.269	0.077 40	0.006 218	0.004 9	0.008 351	0.003 251	0.007 18	0.003 108	0.005 13	0.001 284
DCP15	.800	0.115	0.047 49	0.009 217	0.008 48	0.009 315	0.002 57	0.006 312	0.001 251	0.011 25	0.005 16
DCP16	.900	-0.067	0.018 62	0.005 247	0.006 310	0.015 333	0.005 233	0.009 248	0.003 232	0.009 26	0.001 240
DCP17	.969	-0.053	0.012 164	0.011 241	0.011 34	0.001 228	0.007 349	0.007 359	0.005 76	0.010 356	0.006 165

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.43	0.226	0.301	2.77	0.0	4.98	12099.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
102.4 (335.9)	27689. (578.3)	0.498 07	-0.019	0.754	7.62	-0.00098	0.829	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.975	2.774	0	0.070	6	0.072	256	0.011	150	0.037	47	0.013	46	0.018	175	0.010	252	0.014	350
CM		0.569	0.192	3	0.005	29	0.004	5	0.012	268	0.002	134	0.001	314	0.004	208	0.004	307	0.000	128
CN		-0.003	0.014	291	0.000	67	0.002	206	0.003	100	0.001	327	0.001	79	0.001	37	0.001	133	0.001	190
DCP 1	.010	2.588	1.301	343	0.026	44	0.022	206	0.023	229	0.011	8	0.014	35	0.006	120	0.019	238	0.001	130
DCP 2	.020	2.106	1.026	349	0.027	24	0.009	235	0.025	259	0.005	278	0.007	22	0.008	150	0.007	249	0.007	185
DCP 3	.030	1.964	0.875	348	0.024	20	0.003	259	0.018	258	0.002	109	0.010	34	0.005	169	0.004	252	0.002	273
DCP 4	.049	1.847	0.731	350	0.014	32	0.005	339	0.019	234	0.000	178	0.002	99	0.005	128	0.001	312	0.000	157
DCP 5	.074	1.622	0.585	350	0.014	35	0.008	277	0.015	252	0.004	242	0.003	197	0.005	121	0.007	305	0.003	234
DCP 6	.099	1.478	0.471	353	0.013	52	0.001	233	0.013	224	0.002	244	0.003	80	0.003	96	0.008	333	0.001	193
DCP 7	.149	1.091	0.378	355	0.019	20	0.005	299	0.013	246	0.003	104	0.007	295	0.004	222	0.007	293	0.006	230
DCP 8	.200	0.884	0.289	2	0.005	343	0.005	330	0.013	265	0.005	202	0.003	53	0.001	139	0.006	309	0.000	294
DCP 9	.250	0.727	0.254	2	0.008	12	0.002	314	0.013	276	0.007	112	0.006	167	0.008	200	0.012	331	0.002	98
DCP10	.300	0.666	0.214	4	0.004	33	0.005	326	0.009	258	0.003	71	0.007	332	0.005	224	0.001	279	0.003	137
DCP11	.399	0.541	0.171	16	0.007	67	0.006	14	0.017	277	0.006	36	0.005	358	0.002	268	0.001	214	0.001	354
DCP12	.501	0.398	0.135	23	0.007	26	0.007	10	0.011	268	0.006	126	0.003	292	0.003	219	0.001	236	0.004	162
DCP13	.600	0.325	0.108	29	0.008	44	0.009	21	0.011	286	0.006	189	0.003	335	0.009	218	0.010	325	0.001	2
DCP14	.701	0.347	0.073	37	0.003	102	0.008	56	0.011	322	0.004	126	0.006	213	0.005	250	0.004	275	0.001	26
DCP15	.800	0.166	0.054	54	0.003	23	0.007	61	0.012	262	0.002	341	0.001	129	0.006	159	0.002	321	0.004	139
DCP16	.900	-0.051	0.025	89	0.011	250	0.009	334	0.012	244	0.004	190	0.003	269	0.006	235	0.009	301	0.012	1
DCP17	.969	-0.053	0.008	131	0.000	217	0.000	266	0.019	279	0.003	129	0.003	282	0.003	163	0.003	21	0.004	259

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.46	0.228	0.299	2.81	0.0	7.48	12099.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.3 (332.4)	27210. (568.3)	0.498 07	-0.018	0.999	10.41	-0.00107	0.900	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.483	2.809	0	0.084	358	0.064	260	0.039	140	0.035	56	0.013	42	0.017	197	0.013	45	0.009	44
CM		0.806	0.192	5	0.009	42	0.003	20	0.007	205	0.002	26	0.001	273	0.002	124	0.008	83	0.002	131
CN		0.002	0.016	288	0.001	271	0.001	291	0.002	24	0.000	260	0.000	65	0.001	334	0.003	271	0.001	359
DCP 1	.010	4.904	1.196	344	0.126	41	0.082	305	0.028	216	0.016	306	0.013	358	0.008	107	0.016	282	0.002	301
DCP 2	.020	3.363	1.054	349	0.021	24	0.020	314	0.003	102	0.001	334	0.006	339	0.011	139	0.011	265	0.003	286
DCP 3	.030	3.022	0.898	349	0.023	0	0.014	335	0.008	36	0.005	11	0.003	340	0.005	78	0.003	238	0.004	334
DCP 4	.049	2.745	0.742	350	0.023	38	0.011	343	0.005	270	0.006	24	0.005	287	0.007	136	0.006	15	0.004	68
DCP 5	.074	2.345	0.584	351	0.017	26	0.004	356	0.004	302	0.004	38	0.001	358	0.010	97	0.005	352	0.005	85
DCP 6	.099	2.056	0.482	353	0.012	36	0.002	339	0.001	166	0.004	351	0.002	10	0.002	160	0.002	347	0.004	105
DCP 7	.149	1.549	0.300	359	0.016	5	0.005	343	0.004	224	0.010	342	0.002	217	0.006	94	0.002	11	0.006	23
DCP 8	.200	1.235	0.287	1	0.012	13	0.005	332	0.010	222	0.001	126	0.008	190	0.010	167	0.004	124	0.010	145
DCP 9	.250	1.030	0.254	4	0.009	30	0.005	338	0.010	185	0.001	87	0.001	88	0.005	98	0.013	78	0.012	94
DCP10	.300	0.925	0.216	7	0.008	44	0.007	11	0.006	143	0.002	46	0.003	31	0.005	349	0.009	40	0.001	154
DCP11	.399	0.747	0.177	19	0.009	56	0.007	65	0.005	198	0.007	91	0.004	235	0.001	322	0.013	84	0.003	283
DCP12	.501	0.555	0.131	24	0.006	67	0.003	70	0.012	221	0.005	13	0.009	330	0.004	35	0.015	99	0.003	287
DCP13	.600	0.431	0.112	35	0.009	65	0.007	35	0.014	204	0.003	23	0.009	92	0.001	43	0.017	78	0.005	169
DCP14	.701	0.427	0.079	48	0.006	69	0.008	63	0.006	211	0.005	162	0.004	223	0.003	185	0.012	95	0.000	288
DCP15	.800	0.205	0.058	57	0.004	132	0.007	168	0.009	211	0.006	255	0.004	346	0.007	151	0.010	108	0.005	56
DCP16	.900	-0.027	0.029	65	0.009	50	0.004	114	0.005	202	0.008	61	0.011	232	0.009	155	0.007	38	0.009	183
DCP17	.969	-0.057	0.007	135	0.003	22	0.006	259	0.010	189	0.007	273	0.001	110	0.004	344	0.012	114	0.002	341

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.50	0.230	0.297	2.76	0.0	9.93	12099.5	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.9 (331.0)	27019. (564.3)	0.49E 07	-0.011	1.195	12.43	-0.00116	0.976	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.927	2.757	0	0.065	16	0.071	249	0.012	292	0.033	41	0.020	47	0.019	158	0.007	279	0.013	336
CN		1.013	0.185	10	0.008	344	0.002	29	0.014	305	0.002	236	0.004	324	0.003	85	0.001	351	0.002	239
CM		0.010	0.017	289	0.001	188	0.001	245	0.005	143	0.001	93	0.001	128	0.001	232	0.001	197	0.001	28
DCP 1	.010	5.493	1.284	349	0.257	260	0.110	144	0.044	196	0.008	48	0.017	139	0.010	295	0.028	166	0.009	287
DCP 2	.020	4.464	0.929	352	0.156	49	0.023	329	0.022	237	0.006	287	0.008	245	0.008	163	0.012	210	0.003	227
DCP 3	.030	3.996	0.874	351	0.033	6	0.010	309	0.010	228	0.008	128	0.001	150	0.007	117	0.005	174	0.002	272
DCP 4	.049	3.553	0.701	352	0.040	18	0.011	287	0.010	213	0.008	140	0.004	40	0.009	159	0.003	252	0.010	133
DCP 5	.074	2.985	0.558	353	0.026	9	0.007	277	0.010	222	0.007	209	0.008	320	0.004	232	0.004	236	0.001	54
DCP 6	.099	2.580	0.456	356	0.021	359	0.001	41	0.014	224	0.008	165	0.001	110	0.006	177	0.007	264	0.00[illegible]	281
DCP 7	.149	1.944	0.352	359	0.010	6	0.006	292	0.007	223	0.006	34	0.001	83	0.010	192	0.005	358	0.005	64
DCP 8	.200	1.564	0.280	7	0.013	343	0.002	229	0.009	260	0.012	179	0.005	25	0.002	156	0.014	224	0.002	245
DCP 9	.250	1.303	0.250	6	0.007	316	0.009	338	0.014	282	0.001	134	0.004	288	0.003	186	0.007	5	0.009	294
DCP10	.300	1.145	0.203	11	0.007	9	0.004	314	0.015	291	0.003	240	0.008	323	0.006	121	0.006	329	0.008	289
DCP11	.399	0.915	0.164	24	0.008	22	0.009	343	0.025	331	0.006	300	0.013	334	0.011	73	0.003	82	0.006	284
DCP12	.501	0.689	0.134	31	0.004	86	0.007	20	0.016	296	0.003	313	0.005	43	0.006	17	0.005	117	0.001	289
DCP13	.600	0.516	0.100	46	0.007	317	0.011	38	0.014	316	0.005	216	0.003	339	0.003	72	0.001	150	0.002	195
DCP14	.701	0.471	0.087	57	0.008	347	0.005	86	0.018	331	0.004	251	0.011	310	0.003	292	0.003	2	0.008	231
DCP15	.800	0.235	0.062	71	0.008	15	0.010	107	0.021	321	0.002	321	0.004	275	0.005	9	0.004	350	0.003	176
DCP16	.900	-0.021	0.035	53	0.007	297	0.007	181	0.024	311	0.003	315	0.005	296	0.011	66	0.010	16	0.006	132
DCP17	.969	-0.068	0.018	72	0.001	347	0.007	321	0.016	324	0.005	189	0.006	282	0.007	144	0.003	327	0.007	241

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.49	0.229	0.298	2.77	0.0	12.42	12099.6	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.0 (331.4)	27119. (566.4)	0.49E 07	-0.089	1.392	14.86	0.00103	-0.863	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.425	2.768	0	0.112	349	0.077	236	0.026	147	0.033	58	0.021	44	0.011	198	0.006	96	0.006	348
CN		1.064	0.325	28	0.049	211	0.038	76	0.032	303	0.017	217	0.012	134	0.007	25	0.004	56	0.007	297
CM		-0.005	0.032	152	0.031	341	0.014	230	0.009	95	0.002	11	0.002	287	0.003	162	0.001	231	0.002	93
DCP 1	.010	5.134	1.306	66	0.823	2	0.383	302	0.214	213	0.054	63	0.060	15	0.078	297	0.055	221	0.024	147
DCP 2	.020	4.095	1.166	89	0.883	24	0.468	295	0.247	222	0.124	195	0.136	146	0.108	62	0.038	325	0.027	230
DCP 3	.030	3.522	1.209	90	0.763	13	0.235	291	0.168	271	0.189	207	0.136	140	0.088	96	0.080	54	0.075	351
DCP 4	.049	3.690	0.783	36	0.183	342	0.068	222	0.044	137	0.016	27	0.012	237	0.019	148	0.010	73	0.018	294
DCP 5	.074	3.049	0.649	42	0.160	338	0.056	198	0.023	108	0.013	335	0.011	203	0.005	107	0.007	150	0.009	310
DCP 6	.099	2.621	0.609	44	0.155	319	0.061	169	0.015	55	0.010	285	0.015	156	0.009	36	0.014	250	0.008	255
DCP 7	.149	1.968	0.564	43	0.169	297	0.075	156	0.024	358	0.006	133	0.004	270	0.003	299	0.003	184	0.005	37
DCP 8	.200	1.644	0.557	33	0.177	262	0.077	117	0.014	312	0.005	189	0.012	54	0.015	341	0.027	200	0.007	28
DCP 9	.250	1.429	0.577	21	0.231	233	0.114	104	0.054	12	0.039	286	0.033	146	0.003	111	0.004	26	0.009	82
DCP10	.300	1.299	0.550	12	0.243	221	0.122	112	0.079	8	0.043	243	0.006	60	0.014	202	0.017	76	0.005	304
DCP11	.399	1.047	0.448	14	0.205	211	0.113	102	0.088	354	0.042	239	0.014	190	0.014	126	0.020	65	0.014	298
DCP12	.501	0.769	0.322	11	0.152	184	0.088	75	0.084	317	0.040	208	0.017	165	0.010	78	0.019	345	0.007	302
DCP13	.600	0.544	0.215	14	0.137	152	0.076	45	0.078	288	0.039	171	0.015	117	0.019	23	0.015	261	0.006	292
DCP14	.701	0.475	0.161	20	0.119	139	0.062	21	0.062	248	0.004	118	0.017	115	0.022	16	0.005	91	0.014	289
DCP15	.800	0.281	0.118	353	0.090	131	0.037	18	0.035	231	0.005	294	0.020	149	0.022	339	0.006	101	0.014	263
DCP16	.900	0.038	0.071	316	0.043	140	0.033	22	0.025	218	0.001	321	0.020	57	0.019	287	0.016	56	0.004	240
DCP17	.969	-0.026	0.036	294	0.015	101	0.025	353	0.017	216	0.013	95	0.013	315	0.007	308	0.006	197	0.002	324

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.46	0.229	0.298	2.68	0.0	14.90	12099.7	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
100.9 (330.9)	27095. (565.9)	0.49E 07	-0.209	1.719	17.53	0.00075	-0.626	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.904	2.683	0	0.158	34	0.155	295	0.068	81	0.043	86	0.018	20	0.007	271	0.018	239	0.006	97
CN		1.099	0.422	55	0.139	329	0.071	221	0.024	148	0.031	93	0.012	14	0.010	44	0.007	28	0.001	71
CN		-0.029	0.084	177	0.043	80	0.024	353	0.014	303	0.014	248	0.007	155	0.004	160	0.002	59	0.002	301
DCP 1	.010	4.480	1.809	130	0.985	78	0.265	61	0.162	21	0.073	331	0.032	300	0.033	281	0.006	223	0.042	181
DCP 2	.020	3.929	1.680	134	0.875	71	0.138	53	0.247	60	0.180	13	0.056	345	0.061	356	0.041	282	0.002	117
DCP 3	.030	3.362	1.544	132	0.573	68	0.176	111	0.204	56	0.102	44	0.105	34	0.078	2	0.052	11	0.009	345
DCP 4	.049	3.486	0.969	107	0.490	46	0.161	340	0.081	316	0.051	312	0.092	231	0.022	149	0.010	167	0.011	219
DCP 5	.074	2.929	0.876	97	0.367	22	0.083	294	0.046	326	0.037	293	0.034	211	0.023	133	0.008	148	0.008	119
DCP 6	.099	2.549	0.821	90	0.327	6	0.067	285	0.048	312	0.021	289	0.033	224	0.032	155	0.009	174	0.020	175
DCP 7	.149	2.027	0.765	72	0.292	349	0.106	291	0.084	279	0.055	219	0.045	172	0.042	132	0.028	94	0.014	84
DCP 8	.200	1.694	0.713	65	0.261	351	0.136	292	0.061	261	0.033	225	0.023	164	0.017	128	0.017	121	0.016	58
DCP 9	.250	1.466	0.712	53	0.268	336	0.198	270	0.090	193	0.037	174	0.041	136	0.024	94	0.032	78	0.033	1
DCP10	.300	1.322	0.691	47	0.295	332	0.196	256	0.088	203	0.063	170	0.036	95	0.005	33	0.032	58	0.026	321
DCP11	.399	1.095	0.612	43	0.259	327	0.185	245	0.052	216	0.088	164	0.043	78	0.019	313	0.054	54	0.017	291
DCP12	.501	0.847	0.517	33	0.215	304	0.159	211	0.064	170	0.105	127	0.064	43	0.033	78	0.068	2	0.019	253
DCP13	.600	0.633	0.434	25	0.187	280	0.157	185	0.075	148	0.112	95	0.062	13	0.048	24	0.065	308	0.030	204
DCP14	.701	0.557	0.350	15	0.154	253	0.125	158	0.069	107	0.099	50	0.050	323	0.030	343	0.046	237	0.020	96
DCP15	.800	0.364	0.282	359	0.134	245	0.090	147	0.072	97	0.079	27	0.038	294	0.022	312	0.032	187	0.018	80
DCP16	.900	0.117	0.171	352	0.107	249	0.066	130	0.050	90	0.056	2	0.035	267	0.020	264	0.035	146	0.015	95
DCP17	.969	0.016	0.064	351	0.052	270	0.030	135	0.023	82	0.027	29	0.013	304	0.014	293	0.010	160	0.007	84

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.54	0.230	0.298	2.67	0.0	17.38	12099.8	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
101.0 (331.4)	27229. (568.7)	0.49E 07	-0.223	1.662	19.[illegible]	-0.00168	1.407	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.381	2.666	0	0.062	76	0.081	63	0.051	156	0.020	313	0.010	76	0.005	78	0.016	94	0.004	265
CN		1.075	0.404	70	0.111	16	0.065	338	0.031	260	0.008	226	0.004	71	0.001	263	0.006	94	0.004	309
CN		-0.065	0.082	197	0.038	146	0.022	112	0.013	44	0.007	12	0.002	296	0.001	288	0.004	287	0.001	251
DCP 1	.010	3.800	1.657	154	0.612	147	0.276	165	0.116	183	0.098	196	0.051	172	0.078	188	0.027	148	0.016	157
DCP 2	.020	3.351	1.547	150	0.305	140	0.265	173	0.097	151	0.114	203	0.063	160	0.050	224	0.037	186	0.018	299
DCP 3	.030	2.880	1.380	135	0.261	171	0.173	147	0.076	172	0.048	183	0.045	218	0.035	205	0.022	235	0.014	346
DCP 4	.049	3.002	1.017	130	0.290	106	0.088	86	0.092	105	0.043	94	0.049	73	0.026	65	0.029	37	0.035	6
DCP 5	.074	2.474	0.883	114	0.176	93	0.082	49	0.015	229	0.032	62	0.024	76	0.005	79	0.014	353	0.019	341
DCP 6	.099	2.144	0.790	101	0.158	81	0.098	38	0.013	263	0.028	29	0.028	67	0.009	350	0.007	308	0.006	269
DCP 7	.149	1.782	0.682	81	0.188	63	0.132	22	0.034	347	0.032	29	0.033	57	0.013	42	0.023	24	0.018	338
DCP 8	.200	1.546	0.625	78	0.229	66	0.128	25	0.048	15	0.031	28	0.024	50	0.018	14	0.014	21	0.018	315
DCP 9	.250	1.387	0.611	78	0.231	43	0.134	6	0.073	350	0.032	342	0.031	2	0.015	308	0.013	340	0.031	240
DCP10	.300	1.296	0.592	65	0.230	32	0.141	4	0.075	336	0.032	346	0.020	315	0.009	296	0.017	342	0.012	283
DCP11	.399	1.162	0.587	60	0.231	16	0.151	2	0.079	323	0.052	329	0.051	305	0.014	303	0.019	310	0.021	282
DCP12	.501	0.959	0.506	49	0.209	358	0.125	336	0.087	280	0.045	280	0.033	262	0.016	271	0.027	288	0.009	236
DCP13	.600	0.741	0.429	40	0.180	339	0.119	310	0.092	247	0.054	226	0.044	174	0.020	176	0.033	165	0.017	150
DCP14	.701	0.654	0.366	29	0.160	325	0.108	283	0.084	223	0.059	192	0.033	137	0.011	121	0.036	108	0.020	89
DCP15	.800	0.477	0.280	20	0.134	312	0.094	260	0.073	194	0.046	155	0.022	98	0.007	247	0.038	93	0.013	47
DCP16	.900	0.204	0.150	20	0.082	308	0.051	253	0.049	165	0.025	143	0.023	65	0.019	68	0.015	53	0.015	333
DCP17	.969	0.044	0.081	42	0.038	298	0.033	276	0.026	183	0.022	138	0.021	93	0.011	66	0.011	51	0.000	351

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.51	0.228	0.300	2.71	0.0	19.89	12099.9	20

V	Q	RN	CMMINI	CNMAXI	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
101.5 (332.9)	27488. (574.1)	0.498E 07	-0.196	1.383	20.35	-0.00444	3.744	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.891	2.713	0	0.040	331	0.075	160	0.029	147	0.028	359	0.009	344	0.015	189	0.013	154	0.010	346
CN		1.018	0.314	86	0.033	118	0.031	72	0.003	351	0.014	293	0.006	331	0.004	356	0.003	202	0.002	195
CM		-0.097	0.075	233	0.010	252	0.008	202	0.003	186	0.004	86	0.003	125	0.001	131	0.001	29	0.001	247
DCP 1	.010	2.679	1.342	176	0.203	265	0.105	213	0.054	314	0.017	41	0.015	189	0.015	56	0.019	200	0.010	311
DCP 2	.020	2.248	0.732	171	0.311	300	0.101	80	0.052	330	0.006	107	0.004	218	0.026	134	0.056	265	0.020	18
DCP 3	.030	1.803	0.333	128	0.095	240	0.035	27	0.021	18	0.010	181	0.044	262	0.018	315	0.004	348	0.008	121
DCP 4	.049	2.630	0.668	148	0.079	218	0.023	195	0.050	280	0.026	318	0.010	260	0.011	70	0.021	355	0.013	323
DCP 5	.074	2.165	0.483	122	0.062	210	0.033	103	0.015	347	0.025	339	0.010	49	0.013	273	0.013	273	0.012	236
DCP 6	.099	1.879	0.398	105	0.071	185	0.042	102	0.006	111	0.017	338	0.005	45	0.008	40	0.011	278	0.014	214
DCP 7	.149	1.600	0.344	88	0.073	121	0.048	85	0.019	136	0.007	330	0.008	117	0.009	336	0.005	172	0.006	76
DCP 8	.200	1.409	0.343	100	0.097	133	0.062	140	0.014	198	0.007	242	0.003	169	0.007	140	0.004	13	0.002	83
DCP 9	.250	1.290	0.368	97	0.090	135	0.066	112	0.021	220	0.003	291	0.009	236	0.020	33	0.021	178	0.014	239
DCP10	.300	1.223	0.386	93	0.091	148	0.058	100	0.024	208	0.019	316	0.015	115	0.011	316	0.012	108	0.025	208
DCP11	.399	1.124	0.427	89	0.069	130	0.067	92	0.019	175	0.030	312	0.026	57	0.013	346	0.012	71	0.026	208
DCP12	.501	0.977	0.415	78	0.078	110	0.068	70	0.019	107	0.034	307	0.028	28	0.008	228	0.007	10	0.013	112
DCP13	.600	0.808	0.401	70	0.048	93	0.052	46	0.020	53	0.030	275	0.027	0	0.005	65	0.005	174	0.018	50
DCP14	.701	0.765	0.381	60	0.056	62	0.042	16	0.024	7	0.012	287	0.025	292	0.007	20	0.013	201	0.009	8
DCP15	.800	0.588	0.308	51	0.036	30	0.031	341	0.030	338	0.016	248	0.029	279	0.006	324	0.006	240	0.004	244
DCP16	.900	0.263	0.195	48	0.017	19	0.023	347	0.017	343	0.007	211	0.009	237	0.007	215	0.008	238	0.002	19
DCP17	.969	0.061	0.084	54	0.002	157	0.009	351	0.006	301	0.016	209	0.019	221	0.008	343	0.010	237	0.002	339

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.99	0.320	0.418	3.11	0.0	0.02	12101.1	20

V	Q	RN	CMMINI	CNMAXI	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
108.8 (356.8)	29940. (625.3)	0.505E 07	-0.039	0.313	3.16	-0.00091	0.745	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.023	3.110	0	0.132	330	0.114	190	0.030	97	0.015	217	0.026	71	0.009	64	0.005	156	0.010	315
CN		0.118	0.188	16	0.011	7	0.035	262	0.033	101	0.003	296	0.002	329	0.001	174	0.002	327	0.001	3
CM		-0.019	0.020	295	0.003	265	0.002	119	0.001	257	0.001	155	0.001	128	0.001	351	0.001	106	0.001	163
DCP 1	.010	-0.799	1.370	347	0.340	330	0.026	49	0.014	75	0.025	196	0.008	351	0.009	23	0.022	244	0.015	89
DCP 2	.020	-0.314	1.018	353	0.260	335	0.015	214	0.038	113	0.014	252	0.012	11	0.011	14	0.033	274	0.022	183
DCP 3	.030	-0.076	0.857	352	0.039	310	0.016	295	0.005	101	0.007	215	0.001	33	0.011	17	0.035	108	0.026	30
DCP 4	.049	0.085	0.695	356	0.033	312	0.036	272	0.014	78	0.006	189	0.007	196	0.008	350	0.013	17	0.035	125
DCP 5	.074	0.196	0.565	356	0.025	323	0.014	196	0.011	91	0.003	139	0.001	284	0.035	41	0.035	148	0.001	81
DCP 6	.099	0.228	0.479	357	0.019	331	0.011	211	0.010	92	0.006	241	0.001	274	0.011	27	0.002	14	0.006	60
DCP 7	.149	0.233	0.340	1	0.019	330	0.013	147	0.003	188	0.003	314	0.004	7	0.006	17	0.003	40	0.006	291
DCP 8	.200	0.195	0.288	13	0.017	0	0.005	280	0.007	290	0.009	337	0.004	350	0.007	128	0.008	57	0.006	129
DCP 9	.250	0.178	0.268	17	0.016	340	0.009	255	0.004	217	0.013	240	0.004	41	0.006	266	0.006	85	0.004	237
DCP10	.300	0.176	0.215	14	0.016	337	0.008	232	0.004	79	0.008	235	0.001	331	0.007	217	0.004	135	0.001	41
DCP11	.399	0.169	0.180	12	0.015	33	0.005	287	0.001	214	0.002	297	0.005	157	0.008	106	0.005	1	0.001	32
DCP12	.501	0.175	0.144	42	0.015	55	0.009	135	0.010	177	0.005	297	0.010	144	0.006	293	0.006	297	0.003	231
DCP13	.600	0.162	0.122	55	0.011	50	0.006	266	0.007	112	0.003	332	0.008	14	0.002	232	0.010	267	0.007	99
DCP14	.701	0.206	0.083	61	0.012	28	0.010	281	0.010	76	0.008	96	0.008	312	0.007	136	0.002	15	0.003	356
DCP15	.800	0.089	0.070	93	0.009	66	0.007	274	0.007	43	0.005	17	0.005	297	0.007	73	0.006	300	0.002	295
DCP16	.900	-0.071	0.036	107	0.010	28	0.016	360	0.006	269	0.006	338	0.008	269	0.006	201	0.006	84	0.003	6
DCP17	.969	-0.036	0.015	197	0.006	129	0.010	193	0.008	43	0.008	270	0.005	151	0.008	266	0.006	245	0.002	9

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.44	0.329	0.311	3.11	0.0	2.49	12101.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
105.8 (347.2)	28666. (598.7)	0.49E 07	-0.035	0.628	5.40	-0.00078	0.699	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.488	3.109 0	0.115 312	0.099 196	0.022 98	0.021 215	0.035 66	0.015 44	0.008 226	0.002 297
CN		0.339	0.195 14	0.008 17	0.006 339	0.003 158	0.003 296	0.002 143	0.000 172	0.004 216	0.001 104
CM		-0.014	0.020 298	0.002 275	0.002 191	0.001 278	0.001 135	0.001 19	0.001 348	0.001 113	0.000 45
DCP 1	.010	0.547	1.342 343	0.060 142	0.060 294	0.032 269	0.022 146	0.006 27	0.018 17	0.010 128	0.015 342
DCP 2	.020	0.838	1.757 357	0.041 309	0.019 231	0.006 117	0.011 210	0.015 19	0.016 331	0.005 174	0.007 66
DCP 3	.030	0.964	1.998 352	0.029 311	0.010 215	0.002 122	0.012 206	0.004 6	0.009 215	0.005 156	0.004 74
DCP 4	.049	0.897	2.217 353	0.020 311	0.013 215	0.003 72	0.007 290	0.006 145	0.006 92	0.005 143	0.009 21
DCP 5	.074	0.859	2.382 354	0.025 321	0.011 247	0.009 163	0.002 227	0.002 48	0.003 329	0.004 127	0.004 347
DCP 6	.099	0.892	2.477 355	0.026 342	0.017 264	0.016 185	0.004 291	0.007 327	0.006 16	0.002 352	0.002 257
DCP 7	.149	0.845	2.364 7	0.017 311	0.011 296	0.007 89	0.006 89	0.008 173	0.004 68	0.005 260	0.006 311
DCP 8	.200	0.536	2.288 13	0.007 318	0.008 317	0.003 23	0.005 326	0.008 46	0.010 199	0.005 244	0.003 199
DCP 9	.249	0.448	[illegible] 11	0.014 347	0.001 318	0.003 127	0.001 137	0.007 103	0.008 107	0.004 106	0.003 316
DCP10	.300	0.417	[illegible]	0.030 85	0.009 0	0.014 265	0.007 257	0.021 19	0.026 285	0.012 294	0.045 116
DCP11	.349	0.38[illegible]	[illegible] 5	0.005 322	0.009 317	0.008 169	0.013 317	0.003 219	0.009 112	0.006 203	0.006 273
DCP12	.498	0.27[illegible]	[illegible]	0.012 96	0.007 314	0.002 131	0.014 290	0.015 178	0.004 148	0.006 78	0.006 16
DCP13	.6[illegible]	[illegible]26	[illegible]	0.029 7	0.028 18	0.027 76	0.019 128	0.026 169	0.017 195	0.024 248	0.019 285
DCP14	.7[illegible]	[illegible]18		0.012 92	0.010 36	0.006 194	0.010 306	0.006 212	0.007 188	0.004 48	0.004 93
DCP15	.[illegible]	[illegible]2[illegible]		0.006 32	0.013 346	0.004 207	0.008 342	0.003 298	0.002 328	0.005 13	0.003 110
DCP16	.[illegible]	[illegible]1[illegible]	0.237 171	0.007 355	0.006 149	0.004 2	0.007 291	0.008 246	0.009 73	0.007 90	0.009 171
DCP17	.96[illegible]	[illegible]4	0.022 249	0.002 48	0.007 304	0.005 221	0.003 123	0.007 59	0.004 32	0.011 308	0.001 179

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.98	0.337	0.304	3.11	0.0	4.98	12101.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
103.2 (338.6)	27435. (573.0)	0.48E 07	-0.034	0.794	7.98	-0.00087	0.761	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.980	3.110 0	0.121 304	0.088 198	0.015 96	0.021 284	0.040 67	0.002 118	0.004 255	0.014 356
CN		0.587	0.193 16	0.013 356	0.005 275	0.001 257	0.006 7	0.004 119	0.001 32	0.002 294	0.002 0
CM		-0.012	0.023 299	0.002 220	0.001 114	0.000 324	0.002 185	0.001 290	0.000 281	0.000 161	0.001 169
DCP 1	.010	1.756	1.[illegible] 347	0.065 324	0.033 261	0.052 226	0.016 94	0.010 128	0.014 349	0.010 60	0.019 343
DCP 2	.020	2.070	1.[illegible] 353	0.066 339	0.016 189	0.004 41	0.005 162	0.006 80	0.004 336	0.002 244	0.007 164
DCP 3	.030	1.[illegible]	[illegible]	0.039 337	0.014 198	0.005 48	0.007 214	0.010 35	0.004 56	0.006 305	0.010 231
DCP 4	.049	1.[illegible]	0.756 [illegible]	0.037 330	0.013 257	0.005 164	0.004 31	0.011 69	0.005 96	0.004 292	0.002 237
DCP 5	.074	1.587	[illegible]	0.029 320	0.010 272	0.006 242	0.002 329	0.005 126	0.003 345	0.005 310	0.002 193
DCP 6	.099	1.493	[illegible]	0.021 336	0.005 256	0.005 318	0.009 22	0.002 189	0.005 175	0.002 169	0.004 177
DCP 7	.149	1.[illegible]	[illegible]	0.023 340	0.006 261	0.008 224	0.010 346	0.002 95	0.003 138	0.003 295	0.002 98
DCP 8	.200	0.906	0.[illegible] 11	0.022 351	0.013 313	0.003 336	0.002 345	0.016 161	0.002 284	0.014 324	0.005 175
DCP 9	.250	0.781	0.262 1	0.016 323	0.009 261	0.010 260	0.001 298	0.012 132	0.005 336	0.010 278	0.005 208
DCP10	.300	0.708	0.[illegible]	0.009 357	0.008 267	0.006 25	0.009 2	0.003 199	0.008 340	0.005 148	0.007 351
DCP11	.399	0.596	0.189 [illegible]	0.010 40	0.005 208	0.002 315	0.008 41	0.006 151	0.005 49	0.004 259	0.013 38
DCP12	.501	0.437	0.149 46	0.013 359	0.005 347	0.002 242	0.004 315	0.003 121	0.005 327	0.002 16	0.006 29
DCP13	.600	0.307	0.127 41	0.013 33	0.004 339	0.002 106	0.006 39	0.009 138	0.004 104	0.004 283	0.006 19
DCP14	.701	0.762	0.098 68	0.015 352	0.009 282	0.001 282	0.015 335	0.009 27	0.008 175	0.005 252	0.002 296
DCP15	.800	0.184	0.064 90	0.021 38	0.012 302	0.002 140	0.010 351	0.008 136	0.006 260	0.006 33	0.003 243
DCP16	.900	-0.047	0.038 111	0.006 0	0.003 181	0.002 191	0.008 110	0.001 247	0.007 78	0.001 144	0.008 325
DCP17	.969	-0.049	0.017 170	0.004 144	0.003 127	0.003 268	0.006 337	0.008 149	0.006 55	0.007 10	0.010 161

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TIMER HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.30	0.341	0.721	3.12	0.0	7.49	12191.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,MMAX	AERO DAMP	TAU	EXT DAMP
102.0 (334.5)	26856. (560.9)	0.488 07	-0.031	1.038	10.47	-0.00000	0.787	.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.448	3.116 0	0.129 299	0.068 287	0.013 116	0.008 8	0.036 78	0.003 96	0.032 290	0.010 335
CN		0.83.	0.195 16	0.013 359	0.006 291	0.002 308	0.003 350	0.002 234	0.002 4	0.000 235	0.001 198
CM		-0.006	0.024 298	0.003 241	0.001 197	0.000 124	0.001 195	0.001 71	0.001 174	0.001 209	0.000 306
XCP 1	.010	3.484	1.313 343	0.029 48	0.003 267	0.023 229	0.026 236	0.012 96	0.013 124	0.044 250	0.019 176
XCP 2	.020	3.746	1.111 352	0.041 319	0.009 280	0.000 243	0.007 283	0.013 32	0.004 41	0.004 294	0.033 135
XCP 3	.030	3.879	0.941 352	0.051 301	0.026 298	0.004 142	0.004 117	0.006 58	0.012 92	0.038 145	0.007 272
XCP 4	.049	2.681	0.777 354	0.037 319	0.022 278	0.011 190	0.002 46	0.007 186	0.004 228	0.006 223	0.004 2
XCP 5	.074	2.308	0.617 356	0.035 323	0.011 265	0.008 268	0.005 71	0.002 98	0.002 15	0.025 186	0.004 190
XCP 6	.099	2.085	0.519 359	0.028 327	0.012 268	0.007 298	0.002 137	0.004 61	0.001 245	0.004 175	0.004 77
XCP 7	.149	1.557	0.385 2	0.027 335	0.014 227	0.006 297	0.010 307	0.003 183	0.002 3	0.005 114	0.007 168
XCP 8	.200	1.275	0.305 .7	0.026 340	0.009 310	0.011 27	0.007 164	0.004 230	0.001 94	0.006 231	0.003 328
XCP 9	.250	1.081	0.256 13	0.020 334	0.008 288	0.008 347	0.001 72	0.001 44	0.005 290	0.008 181	0.010 88
XCP10	.300	0.963	0.227 18	0.016 342	0.003 35	0.009 246	0.006 294	0.007 147	0.004 34	0.003 142	0.007 147
XCP11	.399	0.803	0.187 36	0.019 25	0.007 281	0.011 336	0.005 279	0.004 173	0.008 349	0.008 259	0.007 270
XCP12	.501	0.692	0.152 42	0.019 1	0.012 231	0. 06 10	0.005 197	0.009 197	0.004 57	0.004 325	0.005 264
XCP13	.600	0.593	0.120 54	0.011 3	0.011 314	0.005 97	0.005 9	0.004 261	0.012 232	0.004 3	0.008 307
XCP14	.701	0.492	0.107 73	0.010 61	0.007 93	0.006 151	0.003 44	0.001 61	0.010 47	0.004 55	0.005 113
XC 15	.800	0.228	0.074 89	0.014 57	0.005 91	0.007 332	0.002 261	0.009 269	0.005 320	0.006 139	0.004 105
XCP16	.900	-0.330	0.043 103	0.012 80	0.010 10	0.001 294	0.008 17	0.008 191	0.002 16	0.004 308	0.007 151
XCP17	.969	-0.051	0.010 148	0.003 35	0.003 276	0.002 336	0.005 351	0.016 289	0.009 10	0.007 21	0.004 20

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TIMER HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.36	0.469	0.299	3.10	0.0	9.93	12191.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,MMAX	AERO DAMP	TAU	EXT DAMP
101.5 (332.9)	26660. (556.8)	0.485 07	-0.027	1.252	12.97	-0.00104	0.002	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.932	3.100 0	0.128 301	0.067 290	0.017 171	0.026 93	0.026 87	0.001 341	0.004 102	0.009 347
CN		1.037	0.197 23	0.015 317	0.002 321	0.022 216	0.004 191	0.001 223	0.004 299	0.002 46	0.002 181
CM		-0.001	0.026 293	0.002 225	0.002 97	0.001 105	0.001 14	0.001 75	0.001 86	0.001 230	0.000 21
. .		4.195	1.374 349	0.293 269	0.155 169	0.058 139	0.044 136	0.012 96	0.033 225	0.023 191	0.036 8
. .		4.471	1.061 356	0.193 19	0.225 196	0.015 174	0.015 226	0.011 69	0.010 231	0.000 173	0.005 238
. .		4.081	0.812 356	0.017 336	0.015 261	0.004 250	0.009 141	0.006 19	0.031 285	0.008 94	0.003 58
. .		3.506	0.733 356	0.043 340	0.008 257	0.009 177	0.004 93	0.004 11	0.006 1	0.004 29	0.013 212
. .		2.889	0.584 358	0.017 338	0.008 220	0.010 136	0.003 29	0.003 97	0.009 282	0.002 29	0.009 115
. .		2.693	0.482 7	0.016 350	0.008 246	0.009 171	0.000 35	0.003 336	0.009 308	0.032 118	0.012 161
. .		1.197	0.372 7	0.008 335	0.011 299	0.002 65	0.001 196	0.004 46	0.009 327	0.003 308	0.001 229
. .		1.605	0.302 19	0.018 352	0.012 304	0.005 49	0.008 295	0.011 107	0.004 7	0.011 177	0.005 167
XCP 8	.250	1.260	0.271 30	0.025 340	0.015 249	0.003 281	0.005 127	0.008 129	0.006 49	0.037 339	0.006 280
XCP10	.300	1.104	0.226 21	0.019 358	0.013 213	0.007 135	0.009 241	0.009 253	0.006 287	0.002 92	0.005 233
XCP11	.399	0.870	0.190 42	0.016 356	0.010 312	0.007 170	0.011 299	0.006 295	0.011 349	0.003 338	0.006 76
XCP12	.501	0.731	0.159 59	0.016 9	0.011 345	0.006 281	0.010 171	0.003 333	0.011 353	0.009 66	0.005 104
XCP13	.600	0.590	0.131 71	0.010 14	0.008 296	0.009 279	0.005 191	0.007 246	0.012 211	0.007 305	0.012 219
XCP14	.701	0.491	0.1 9 75	0.017 29	0.006 112	0.002 19	0.005 176	0.010 96	0.010 290	0.008 350	0.006 90
XCP15	.800	0.257	0.087 89	0.010 28	0.010 57	0.004 326	0.006 283	0.010 295	0.004 187	0.004 189	0.005 189
XCP16	.900	-0.125	0.038 96	0.006 294	0.012 327	0.010 223	0.003 97	0.006 241	0.014 353	0.013 93	0.002 294
XCP17	.969	-0.058	0.028 124	0.006 293	0.013 62	0.001 223	0.005 12.	0.006 1	0.017 295	0.006 7	0.006 319

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLF 1

TUNNEL MZ	NATIVE MZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
1.0	68.76	0.369	0.700	9.39	0.0	12.44	12191.6	29

V	Q	PN	CN(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TRO	FRT DAMP
101.4 (332.6)	26621. (556.0)	0.6[illegible] 07	-0.758	1.434	15.76	0.00048	-0.419	0.0

HARMONIC ANALYSIS

DATA TYPE	K/F	DFS 0	DFS 1 PHI	DFS 2 PHI	DFS 3 PHI	DFS 4 PHI	DFS 5 PHI	DFS 6 PHI	DFS 7 PHI	DFS 8 PHI	DFS 9 PHI
ALPHA		12.443	3.992 3	0.171 298	0.059 237	3.014 198	0.036 84	0.021 87	0.006 84	0.004 195	0.012 304
CN		1.111	0.325 12	0.041 115	0.039 323	0.018 199	0.012 105	0.005 264	0.005 91	0.001 202	0.002 14
CM		-0.096	0.017 134	0.026 287	0.011 173	0.003 294	0.003 276	0.004 99	0.001 331	0.001 350	0.001 2[illegible]
PCP 1	.010	4.417	1.519 69	0.759 326	0.212 239	0.028 352	0.120 280	0.063 226	0.011 178	0.009 27	0.026 [illegible]29
PCP 2	.020	4.295	1.256 63	0.868 349	0.076 44	0.225 164	0.106 120	0.107 69	0.000 319	0.042 175	0.043 61
PCP 3	.030	3.714	1.298 68	0.725 338	0.179 266	0.232 224	0.218 123	0.134 57	0.005 15	0.079 301	0.054 240
PCP 4	.049	3.763	0.836 14	0.849 323	0.037 194	0.019 95	0.005 210	0.019 108	0.013 358	0.006 281	0.036 147
PCP 5	.074	3.165	0.688 16	0.843 313	0.019 179	0.019 62	0.010 238	0.014 127	0.014 354	0.010 191	0.035 42
PCP 6	.099	2.756	0.627 20	0.874 290	0.023 119	0.00[illegible] 354	0.019 223	0.019 139	0.014 352	0.020 81	0.026 11
PCP 7	.149	2.068	0.586 22	0.890 251	0.041 59	0.00[illegible] 307	0.008 126	0.011 274	0.007 [illegible]	0.003 291	0.007 356
PCP 8	.299	1.727	0.502 18	0.130 216	0.046 47	0.018 227	0.017 61	0.005 253	0.006 71	0.004 323	0.006 219
PCP 9	.398	1.555	0.504 357	0.211 187	0.102 15	0.034 249	0.014 117	0.018 299	0.009 141	0.004 25	0.009 357
PCP10	.500	1.406	0.575 350	0.212 185	0.107 22	0.060 244	0.049 48	0.045 218	0.012 65	0.006 299	0.010 175
PCP11	.599	1.138	0.419 354	0.191 191	0.090 19	0.045 236	0.011 1	0.027 165	0.025 19	0.020 232	0.009 343
PCP12	.699	0.806	0.295 358	0.150 183	0.090 343	0.064 209	0.019 170	0.024 [illegible]	0.022 281	0.011 199	0.009 271
PCP13	.800	0.588	0.195 11	0.139 80	0.096 331	0.044 170	0.013 136	0.038 342	0.023 181	0.009 7	0.011 121
PCP14	.751	0.644	0.129 17	0.119 74	0.065 279	0.037 129	0.016 148	0.035 304	0.019 87	0.014 185	0.008 108
PCP15	.850	0.269	0.054 357	0.072 54	0.036 284	0.020 99	0.020 93	0.025 264	0.013 77	0.012 188	0.000 280
PCP16	.900	0.037	0.015 311	0.047 52	0.050 256	0.036 26	0.015 109	0.026 220	0.004 336	0.006 67	0.010 321
PCP17	.949	-0.023	0.009 311	0.017 19	0.027 238	0.011 59	0.014 30	0.006 231	0.009 204	0.009 84	0.015 [illegible]

FORCED PITCHING OSCILLATION AIRFOIL NLF 1

TUNNEL MZ	NATIVE MZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
.0	58.12	0.744	0.700	9.07	0.0	14.89	12191.7	29

V	Q	PN	CN(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TRO	FRT DAMP
101.2 (332.1)	26607. (555.7)	0.6[illegible] 07	-0.7[illegible]	1.761	17.81	0.00764	-2.[illegible]	0.0

HARMONIC ANALYSIS

DATA TYPE	K/F	DFS 0	DFS 1 PHI	DFS 2 PHI	DFS 3 PHI	DFS 4 PHI	DFS 5 PHI	DFS 6 PHI	DFS 7 PHI	DFS 8 PHI	DFS 9 PHI
ALPHA		14.890	3.968 3	0.176 310	0.032 83	0.015 182	0.022 110	0.015 97	0.007 44	0.002 188	0.008 330
CN		1.171	0.407 17	0.124 [illegible]	0.036 [illegible]	0.006 11	0.014 173	0.007 [illegible]	0.013 [illegible]	0.001 [illegible]	0.007 157
CM		-0.[illegible]	0.[illegible] 131	0.[illegible] [illegible]	0.[illegible] [illegible]	0.017 159	0.01[illegible] 350	0.003 [illegible]	0.001 77	0.002 210	0.001 149
PCP 1	.010	3.520	1.[illegible] 71	0.882 25	0.[illegible] [illegible]	0.223 [illegible]	0.[illegible] 265	0.[illegible] 149	0.[illegible] 42	0.[illegible] 32	0.[illegible] 48
PCP 2	.020	3.[illegible]	1.[illegible] 67	0.[illegible] 11	0.[illegible] [illegible]	0.[illegible] 120	0.[illegible] 265	0.[illegible] 266	0.[illegible] 21[illegible]	0.[illegible] 290	0.[illegible] 139
PCP 3	.030	3.[illegible]	1.[illegible] 71	0.[illegible] 14	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 262	0.[illegible] 212	0.[illegible] 165
PCP 4	.049	3.[illegible]	1.[illegible] 61	0.[illegible] 141	0.[illegible] 236	0.[illegible] 199	0.[illegible] 142	0.[illegible] 73	0.[illegible] [illegible]	0.[illegible] 311	0.[illegible] 229
PCP 5	.074	3.[illegible]	1.[illegible] 59	0.[illegible] 316	0.[illegible] [illegible]	0.[illegible] 169	0.[illegible] 120	0.[illegible] 96	0.[illegible] [illegible]	0.[illegible] 281	0.[illegible] 220
PCP 6	.099	2.[illegible]	1.[illegible] 65	0.[illegible] 305	0.[illegible] [illegible]	0.[illegible] 157	0.[illegible] 130	0.[illegible] 96	0.[illegible] [illegible]	0.[illegible] 290	0.[illegible] 202
PCP 7	.149	2.[illegible]	1.[illegible] 70	0.[illegible] 267	0.[illegible] [illegible]	0.[illegible] 175	0.[illegible] 62	0.[illegible] 91	0.[illegible] [illegible]	0.[illegible] 276	0.[illegible] 189
PCP 8	.200	1.[illegible]	0.[illegible] 24	0.[illegible] 269	0.[illegible] [illegible]	0.[illegible] 122	0.[illegible] 82	0.[illegible] 6	0.[illegible] [illegible]	0.[illegible] 261	0.[illegible] 161
PCP 9	.250	1.[illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 165	0.[illegible] 93	0.[illegible] 56	0.[illegible] [illegible]	0.[illegible] 260	0.[illegible] 170	0.[illegible] 137
PCP10	.300	1.[illegible]	0.[illegible] 6	0.[illegible] [illegible]	0.[illegible] 161	0.[illegible] 96	0.[illegible] 59	0.[illegible] 349	0.[illegible] 236	0.[illegible] 173	0.[illegible] 144
PCP11	.399	1.[illegible]	0.[illegible] 7	0.[illegible] [illegible]	0.[illegible] 131	0.[illegible] 78	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 236	0.[illegible] 138	0.[illegible] 102
PCP12	.501	0.[illegible]	0.[illegible] 356	0.[illegible] 292	0.[illegible] 92	0.[illegible] 31	0.[illegible] 267	0.[illegible] 191	0.[illegible] 97	0.[illegible] 33
PCP13	.600	0.[illegible]	0.[illegible] 344	0.[illegible] 176	0.[illegible] 57	0.[illegible] 2	0.[illegible] 226	0.[illegible] 179	0.[illegible] 72	0.[illegible] 346	0.[illegible] 259
PCP14	.751	0.[illegible]	0.[illegible] [illegible]	0.[illegible] 167	0.[illegible] 17	0.[illegible] [illegible]	0.[illegible] 169	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 256	0.[illegible] 167
PCP15	.800	0.[illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 175	.012 89	0.[illegible] [illegible]	0.[illegible] 213	0.[illegible] 111
PCP16	.850	0.[illegible]	0.[illegible] 289	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 51	0.[illegible] [illegible]	0.[illegible] 6	0.[illegible] 296
PCP17	.949	0.[illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 23	0.[illegible] [illegible]

C-2

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TIMED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.28	0.944	0.299	3.00	0.0	17.34	12101.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MMAX	AERO DAMP	TOR	EXT DAMP
100.9 (331.2)	26526. (554.0)	0.485 07	-0.268	1.954	20.51	0.0020	-2.631	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		17.357	2.999 0	0.289 347	0.086 149	0.023 144	0.002 85	0.015 5	0.009 64	0.003 73	0.006 131
CN		1.248	0.525 30	0.154 285	0.065 204	0.015 83	0.009 186	0.015 121	0.003 50	0.002 77	0.002 81
CM		-0.080	0.114 149	0.054 76	0.014 329	0.013 236	0.007 164	0.011 13	0.002 118	0.003 110	0.001 4
RED 1	.010	3.292	2.136 116	0.446 72	0.521 116	0.334 74	0.132 29	0.080 321	0.081 271	0.028 185	0.019 56
RED 2	.020	3.219	1.994 114	0.401 71	0.439 121	0.261 56	0.110 62	0.035 67	0.064 96	0.009 47	0.023 33
RED 3	.030	3.206	1.729 115	0.187 47	0.345 134	0.129 88	0.147 91	0.092 101	0.094 92	0.0 1 97	0.065 81
RED 4	.040	3.402	1.747 99	0.529 20	0.176 312	0.160 322	0.126 255	0.028 193	0.040 257	0 6 105	0.039 200
RED 5	.050	2.914	1.140 77	0.382 356	0.090 297	0.122 331	0.098 228	0.044 179	0.037 200	0.04 141	0.036 83
RED 6	.060	2.668	1.100 67	0.337 341	0.098 279	0.097 299	0.073 217	0.027 190	0.022 193	0.009 126	0.015 136
RED 7	.140	2.134	1.050 48	0.352 330	0.158 268	0.088 272	0.092 217	0.052 155	0.021 116	0.006 71	0.014 97
RED 8	.200	1.933	0.965 48	0.421 332	0.133 259	0.084 292	0.114 218	0.049 163	0.022 138	0.023 119	0.006 176
RED 9	.250	1.668	0.954 35	0.450 318	0.176 246	0.119 263	0.096 177	0.071 144	0.044 82	0.030 49	0.013 5
RED10	.300	1.529	0.880 29	0.436 307	0.160 243	0.116 215	0.079 158	0.069 113	0.055 72	0.034 5	0.016 303
RED11	.399	1.357	0.822 25	0.405 301	0.194 237	0.151 182	0.076 137	0.054 82	0.027 72	0.026 54	0.029 339
RED12	.501	1.088	0.682 8	0.324 244	0.169 206	0.155 125	0.094 78	0.070 17	0.051 322	0.032 335	0.013 175
RED13	.600	0.904	0.619 352	0.327 234	0.149 172	0.140 89	0.097 22	0.051 321	0.051 267	0.027 153	0.008 140
RED14	.701	0.760	0.572 336	0.299 232	0.126 127	0.130 36	0.080 319	0.037 221	0.038 243	0.015 103	0.006 19
RED15	.800	0.554	0.387 322	0.266 177	0.080 91	0.106 1	0.062 275	0.033 163	0.006 227	0.017 147	0.009 170
RED16	.900	0.221	0.155 317	0.125 148	0.030 93	0.068 344	0.045 261	0.029 126	0.031 355	0.036 278	0.012 114
RED17	.960	0.177	0.088 332	0.089 161	0.050 62	0.028 302	0.017 356	0.010 241	0.031 105	0.021 304	0.015 213

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TIMED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.29	0.946	0.297	3.00	0.0	19.91	12131.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MMAX	AERO DAMP	TOR	EXT DAMP
100.6 (330.0)	26368. (550.7)	0.484 07	-0.279	1.769	22.20	-3.99154	1.683	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	REF 0	REF 1 PHI	REF 2 PHI	REF 3 PHI	REF 4 PHI	REF 5 PHI	REF 6 PHI	REF 7 PHI	REF 8 PHI	REF 9 PHI
ALPHA		19.814	3.005 0	0.332 326	0.108 316	0.023 148	0.043 65	0.018 67	0.008 316	0.033 183	0.006 64
CN		1.125	0.696 50	0.119 353	0.142 241	0.015 176	0.006 1	0.006 158	0.011 77	0.006 338	0.003 150
CM		-0.110	0.100 233	0.030 133	0.013 53	0.005 336	0.001 329	0.001 278	0.002 235	0.002 76	0.001 184
RED 1	.010	2.329	1.333 147	0.327 132	0.152 230	0.067 152	0.057 244	0.033 241	0.047 310	0.027 227	0.011 312
RED 2	.020	2.073	1.338 136	0.126 220	0.072 264	0.055 227	0.033 0	0.015 269	0.021 79	0.021 199	0.009 161
RED 3	.030	2.630	1.076 98	0.161 153	0.030 346	0.008 84	0.012 3	0.001 144	0.009 168	0.017 173	0.007 184
RED 4	.040	2.384	0.924 110	0.112 3	0.048 331	0.068 301	0.063 331	0.016 227	0.013 295	0.029 177	0.027 170
RED 5	.074	2.220	0.537 77	0.161 8	0.057 313	0.025 307	0.033 279	0.038 247	0.017 162	0.031 168	0.020 126
RED 6	.098	1.872	0.585 58	0.182 16	0.046 290	0.022 260	0.028 282	0.029 239	0.036 178	0.038 65	0.025 186
RED 7	.145	1.653	0.566 47	0.199 36	0.044 335	0.016 274	0.011 267	0.019 231	0.011 113	0.019 156	0.018 33
RED 8	.200	1.525	0.499 69	0.208 38	0.047 328	0.005 88	0.017 68	0.016 169	0.003 45	0.013 76	0.018 331
RED 9	.250	1.485	0.469 60	0.215 35	0.049 291	0.020 141	0.023 95	0.017 125	0.033 348	0.010 1	0.015 312
RED10	.300	1.417	0.443 55	0.190 17	0.055 296	0.025 116	0.016 61	0.024 49	0.026 288	0.016 190	0.013 105
RED11	.399	1.312	0.484 54	0.205 18	0.049 339	0.011 208	0.017 58	0.011 148	0.020 341	0.031 351	0.013 284
RED12	.501	1.121	0.453 43	0.188 356	0.047 264	0.027 185	0.014 46	0.020 86	0.027 48	0.016 268	0.015 276
RED13	.600	0.973	0.400 35	0.184 334	0.035 261	0.016 213	0.005 329	0.013 52	0.018 167	0.010 254	0.020 293
RED14	.701	0.850	0.374 27	0.145 305	0.040 333	0.011 175	0.012 313	0.008 307	0.013 129	0.030 194	0.014 61
RED15	.800	0.643	0.262 19	0.159 286	0.027 318	0.002 142	0.011 293	0.016 231	0.020 76	0.035 278	0.010 19
RED16	.900	0.313	0.129 20	0.126 279	0.018 193	0.014 112	0.001 27	0.005 195	0.016 301	0.016 201	0.010 25
RED17	.960	0.201	0.130 27	0.120 287	0.023 211	0.017 68	0.015 179	0.012 113	0.024 346	0.022 252	0.010 149

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.085	0.404	2.69	0.0	0.00	12103.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,MMAX	AERO DAMP	TAU	EXT DAMP
138.1 (453.2)	49020. (1023.8)	0.648 07	-0.122	0.360	2.75	-0.00070	1.778	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.002	2.631	7	0.048	9	0.057	219	0.016	139	0.022	30	0.011	2	0.010	140	0.015	192	0.010	29
CN		0.119	0.242	353	0.005	357	0.001	143	0.001	192	0.001	183	0.001	299	0.001	52	0.000	188	0.001	127
CM		-0.015	0.006	305	0.000	164	0.000	312	0.000	267	0.000	81	0.000	108	0.000	277	0.001	298	0.000	351
DCP 1	.010	-0.594	1.648	347	0.061	33	0.017	122	0.005	178	0.007	207	0.003	246	0.003	298	0.012	262	0.002	44
DCP 2	.020	-0.365	1.241	350	0.025	352	0.009	140	0.011	196	0.006	242	0.002	234	0.004	314	0.013	288	0.003	70
DCP 3	.030	-0.077	1.038	350	0.019	313	0.003	117	0.007	197	0.004	249	0.002	261	0.006	314	0.006	290	0.002	196
DCP 4	.049	0.143	0.851	349	0.016	324	0.002	43	0.003	204	0.003	179	0.002	255	0.003	24	0.007	287	0.003	130
DCP 5	.074	0.274	0.697	350	0.012	335	0.001	192	0.001	271	0.001	138	0.004	257	0.001	23	0.006	296	0.006	127
DCP 6	.099	0.356	0.593	351	0.010	340	0.000	101	0.001	209	0.000	113	0.002	226	0.002	347	0.007	287	0.002	121
DCP 7	.149	0.367	0.439	351	0.010	13	0.007	318	0.007	235	0.003	144	0.004	226	0.005	57	0.006	315	0.001	185
DCP 8	.200	0.197	0.357	354	0.009	348	0.007	139	0.004	153	0.003	139	0.004	270	0.003	246	0.011	291	0.001	47
DCP 9	.250	0.176	0.315	343	0.003	334	0.001	257	0.003	178	0.003	195	0.001	181	0.002	71	0.009	52	0.001	88
DCP10	.300	0.187	0.268	352	0.005	358	0.001	109	0.001	102	0.002	157	0.002	206	0.001	209	0.002	68	0.001	86
DCP11	.399	0.164	0.211	358	0.006	358	0.001	298	0.003	190	0.003	338	0.004	275	0.001	356	0.004	148	0.003	92
DCP12	.501	0.118	0.164	359	0.004	349	0.004	179	0.002	249	0.002	217	0.002	219	0.002	154	0.002	147	0.001	277
DCP13	.600	0.146	0.124	1	0.004	88	0.003	177	0.002	247	0.001	284	0.001	277	0.002	131	0.006	116	0.004	314
DCP14	.701	0.206	0.086	7	0.003	18	0.002	157	0.002	324	0.001	207	0.002	232	0.001	240	0.002	142	0.002	160
DCP15	.800	0.084	0.054	9	0.002	317	0.002	67	0.001	164	0.002	159	0.003	19	0.004	94	0.005	93	0.002	126
DCP16	.900	-0.096	0.013	4	0.000	302	0.002	78	0.001	45	0.002	150	0.002	146	0.002	48	0.002	124	0.004	169
DCP17	.969	-0.044	0.009	148	0.002	276	0.001	26	0.004	115	0.006	143	0.007	24	0.002	190	0.004	78	0.001	329

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	29.06	0.086	0.404	2.69	0.0	2.69	12103.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,MMAX	AERO DAMP	TAU	EXT DAMP
136.2 (446.7)	47957. (1001.6)	0.648 07	-0.020	0.616	5.01	-0.00070	0.760	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.424	2.626	0	0.064	2	0.063	218	0.028	143	0.032	33	0.014	39	0.017	177	0.012	297	0.010	359
CN		0.969	0.245	353	0.005	6	0.003	256	0.001	233	0.001	294	0.001	75	0.001	118	0.005	345	0.000	151
CM		-0.011	0.006	311	0.000	294	0.001	93	0.000	75	0.001	103	0.000	233	0.001	294	0.002	143	0.000	182
DCP 1	.010	1.043	1.586	347	0.028	353	0.038	283	0.000	111	0.002	238	0.003	43	0.004	189	0.013	71	0.006	161
DCP 2	.020	0.903	1.275	350	0.026	338	0.009	292	0.001	227	0.002	273	0.002	85	0.005	213	0.014	82	0.004	201
DCP 3	.030	0.994	1.085	350	0.023	355	0.010	302	0.001	240	0.001	124	0.001	87	0.004	222	0.730	63	0.003	166
DCP 4	.049	1.024	0.894	350	0.017	337	0.005	273	0.003	80	0.004	69	0.005	153	0.001	242	0.008	71	0.001	185
DCP 5	.074	0.994	0.718	350	0.013	337	0.007	298	0.006	52	0.003	58	0.001	161	0.003	186	0.006	89	0.005	190
DCP 6	.099	0.970	0.605	351	0.014	350	0.005	304	0.002	110	0.004	22	0.004	138	0.002	210	0.004	85	0.004	176
DCP 7	.149	0.708	0.443	351	0.007	347	0.004	276	0.005	222	0.005	94	0.007	177	0.001	297	0.007	107	0.002	149
DCP 8	.200	0.570	0.372	354	0.008	6	0.011	301	0.004	76	0.003	145	0.001	333	0.001	315	0.010	71	0.003	123
DCP 9	.250	0.500	0.316	353	0.008	9	0.003	230	0.001	320	0.001	69	0.002	74	0.002	74	0.008	349	0.000	289
DCP10	.300	0.462	0.263	344	0.009	24	0.003	252	0.003	180	0.000	229	0.006	20	0.002	13	0.006	305	0.001	278
DCP11	.399	0.384	0.212	358	0.007	21	0.003	210	0.003	226	0.004	299	0.004	68	0.001	137	0.010	127	0.000	31
DCP12	.501	0.286	0.161	358	0.004	37	0.005	212	0.004	234	0.006	287	0.000	89	0.006	92	0.007	101	0.002	153
DCP13	.600	0.272	0.122	1	0.004	358	0.003	225	0.003	155	0.003	264	0.002	157	0.003	87	0.008	334	0.001	14
DCP14	.701	0.295	0.084	2	0.002	29	0.001	190	0.003	286	0.002	293	0.004	96	0.006	124	0.006	343	0.002	295
DCP15	.800	0.134	0.049	10	0.003	67	0.001	81	0.002	346	0.004	157	0.001	41	0.004	132	0.006	353	0.003	276
DCP16	.900	-0.085	0.018	14	0.001	11	0.006	239	0.003	273	0.005	327	0.001	279	0.005	141	0.012	312	0.006	48
DCP17	.969	-0.049	0.011	191	0.002	1	0.002	193	0.002	162	0.002	295	0.004	93	0.006	89	0.006	345	0.001	37

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.087	0.400	2.63	0.0	4.89	12103.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TPD	EXT DAMP
134.7 (441.9)	47090 (983.5)	0.638 07	-0.015	0.868	7.55	-0.00008	3.991	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.890	2.632 0	0.060 7	0.050 228	0.031 124	0.024 37	0.016 69	0.017 177	0.004 92	0.013 19
CN		0.626	0.244 354	0.005 24	0.002 24	0.001 225	0.001 233	0.000 242	0.001 16	0.001 16	0.001 81
CM		-0.006	0.008 310	0.001 258	0.001 193	0.000 70	0.000 20	0.000 92	0.001 291	0.001 222	0.000 270
DCP 1	.010	2.727	1.642 347	0.050 279	0.026 145	0.009 49	0.003 227	0.007 67	0.006 140	0.009 266	0.002 113
DCP 2	.020	2.234	1.295 350	0.022 327	0.007 116	0.003 240	0.005 141	0.007 70	0.002 192	0.008 293	0.002 24
DCP 3	.030	2.126	1.086 350	0.018 356	0.008 148	0.003 102	0.005 149	0.006 69	0.004 147	0.007 310	0.002 293
DCP 4	.049	1.977	0.923 350	0.015 333	0.001 295	0.001 156	0.001 218	0.003 113	0.005 294	0.005 265	0.001 131
DCP 5	.074	1.763	0.732 350	0.012 351	0.004 316	0.000 70	0.002 295	0.003 82	0.002 311	0.003 312	0.002 195
DCP 6	.099	1.607	0.603 351	0.009 8	0.004 2	0.001 183	0.001 226	0.004 104	0.004 266	0.002 290	0.002 162
DCP 7	.149	1.184	0.464 351	0.014 24	0.004 114	0.005 256	0.004 243	0.001 109	0.005 195	0.004 340	0.001 204
DCP 8	.200	0.960	0.367 354	0.006 21	0.002 349	0.002 194	0.004 339	0.002 156	0.004 270	0.003 291	0.003 270
DCP 9	.250	0.820	0.308 344	0.007 12	0.002 17	0.002 108	0.002 234	0.004 126	0.004 98	0.002 17	0.002 47
DCP10	.300	0.715	0.259 355	0.007 48	0.002 51	0.003 115	0.002 223	0.003 233	0.001 115	0.003 25	0.002 70
DCP11	.349	0.603	0.205 350	0.007 48	0.002 343	0.001 93	0.002 294	0.003 274	0.002 181	0.006 40	0.002 47
DCP12	.501	0.453	0.160 0	0.006 39	0.003 309	0.003 308	0.003 182	0.001 10	0.002 98	0.004 5	0.003 61
DCP13	.600	0.394	0.119 4	0.008 24	0.002 27	0.001 81	0.001 37	0.001 765	0.002 325	0.005 26	0.001 160
DCP14	.701	0.380	0.081 7	0.004 49	0.004 35	0.002 246	0.002 248	0.003 339	0.001 44	0.004 17	0.003 337
DCP15	.800	0.186	0.049 13	0.005 92	0.005 19	0.004 213	0.001 61	0.001 159	0.001 170	0.004 35	0.004 90
DCP16	.900	-0.069	0.019 22	0.003 348	0.002 324	0.002 309	0.002 210	0.004 273	0.003 102	0.002 13	0.002 210
DCP17	.969	-0.062	0.005 193	0.004 124	0.005 68	0.001 198	0.002 214	0.002 202	0.004 293	0.010 69	0.005 187

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.088	0.396	2.63	0.0	7.39	12103.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TPD	EXT DAMP
133.3 (437.3)	46319. (967.4)	0.638 07	-0.009	1.087	10.02	-0.00174	1.214	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.386	2.634 0	0.060 14	0.051 233	0.033 119	0.024 27	0.013 70	0.015 172	0.001 63	0.010 0
CN		0.873	0.227 358	0.021 28	0.011 291	0.002 132	0.001 252	0.002 127	0.001 293	0.004 44	0.001 87
CM		0.002	0.012 321	0.003 221	0.002 193	0.000 254	0.000 27	0.000 306	0.001 91	0.001 206	0.000 126
DCP 1	.010	4.709	2.742 349	0.080 297	0.144 334	0.097 234	0.021 190	0.026 197	0.024 108	0.011 88	0.013 82
DCP 2	.020	3.569	1.998 353	0.118 300	0.141 177	0.131 77	0.053 347	0.016 21	0.029 336	0.023 226	0.015 152
DCP 3	.030	3.203	0.974 351	0.074 42	0.036 322	0.014 78	0.010 341	0.008 239	0.008 132	0.010 109	0.003 82
DCP 4	.049	2.895	0.817 352	0.074 46	0.035 331	0.007 236	0.004 238	0.004 91	0.004 83	0.005 48	0.004 20
DCP 5	.074	2.502	0.658 352	0.068 37	0.015 324	0.009 235	0.003 188	0.000 65	0.002 78	0.006 74	0.001 26
DCP 6	.099	2.213	0.543 354	0.035 34	0.014 314	0.004 171	0.002 196	0.002 47	0.004 90	0.333 87	0.001 57
DCP 7	.149	1.651	0.413 354	0.028 19	0.007 299	0.002 138	0.003 301	0.004 73	0.001 291	0.005 91	0.000 227
DCP 8	.200	1.333	0.340 358	0.021 24	0.003 296	0.002 156	0.001 5	0.001 127	0.001 118	0.005 148	0.004 108
DCP 9	.250	1.137	0.286 357	0.018 22	0.003 274	0.003 167	0.004 52	0.003 167	0.001 174	0.005 31	0.333 98
DCP10	.300	1.001	0.233 347	0.019 19	0.019 272	0.002 85	0.001 68	0.003 171	0.001 234	0.003 36	0.002 34
DCP11	.349	0.813	0.185 3	0.021 11	0.011 297	0.005 114	0.001 137	0.002 133	0.001 55	0.005 51	0.001 158
DCP12	.501	0.617	0.137 7	0.021 31	0.009 290	0.001 336	0.002 207	0.001 138	0.001 120	0.004 46	0.002 141
DCP13	.600	0.505	0.095 16	0.021 42	0.012 299	0.002 226	0.002 121	0.000 88	0.001 58	0.002 0	0.004 107
DCP14	.701	0.482	0.052 27	0.023 35	0.011 285	0.001 144	0.001 231	0.001 139	0.004 273	0.005 67	0.001 302
DCP15	.800	0.219	0.031 47	0.018 46	0.012 292	0.002 296	0.002 199	0.003 93	0.005 284	0.006 29	0.001 329
DCP16	.900	-0.056	0.011 45	0.011 20	0.010 272	0.003 50	0.003 291	0.005 212	0.001 264	0.006 144	0.001 312
DCP17	.969	-0.067	0.001 64	0.007 13	0.009 332	0.002 30	0.005 219	0.004 47	0.002 208	0.010 91	0.001 291

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.08	0.089	0.395	2.64	0.0	0.87	12199.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TAU	PET DAMP
132.8 (435.6)	46070. (962.2)	0.638 07	-0.032	1.214	11.96	-0.00127	1.478	0.9

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.868	2.641 0	0.066 16	0.049 274	0.014 106	0.025 7	0.006 232	0.011 141	0.019 96	0.008 350
CN		1.015	0.115 42	0.072 28	0.016 263	0.003 157	0.004 236	0.006 141	0.007 49	0.007 49	0.002 241
CM		0.011	0.014 305	0.007 108	0.006 195	0.004 262	0.001 183	0.001 227	0.000 99	0.002 211	0.001 68
DCP 1	.010	5.777	0.500 342	0.766 94	0.166 61	0.023 14	0.074 125	0.013 47	0.009 45	0.012 3	0.010 287
DCP 2	.020	4.551	0.870 9	0.270 46	0.128 16	0.122 311	0.102 352	0.050 345	0.050 342	0.022 25	0.021 351
DCP 3	.050	4.077	0.725 16	0.269 19	0.114 340	0.134 299	0.084 256	0.055 239	0.038 213	0.024 167	0.011 160
DCP 4	.049	3.470	0.546 22	0.248 46	0.086 317	0.071 278	0.054 230	0.029 217	0.019 193	0.017 140	0.010 168
DCP 5	.074	2.922	0.224 25	0.213 59	0.072 328	0.049 262	0.032 192	0.017 132	0.006 63	0.008 107	0.006 159
DCP 6	.099	2.640	0.175 32	0.193 55	0.044 330	0.040 249	0.020 190	0.009 132	0.005 103	0.009 96	0.003 110
DCP 7	.149	1.967	0.135 29	0.145 22	0.044 278	0.012 204	0.010 177	0.014 170	0.021 109	0.020 47	0.007 336
DCP 8	.200	1.590	0.232 31	0.126 11	0.044 267	0.014 193	0.014 161	0.010 129	0.009 64	0.014 19	0.009 245
DCP 9	.250	1.343	0.191 34	0.110 9	0.060 249	0.028 162	0.006 102	0.013 120	0.016 55	0.013 350	0.006 291
DCP10	.300	1.158	0.152 39	0.088 8	0.039 240	0.017 134	0.002 108	0.011 115	0.013 12	0.006 2	0.002 155
DCP11	.399	0.925	0.119 54	0.072 14	0.030 231	0.014 109	0.000 311	0.009 167	0.009 56	0.007 48	0.003 167
DCP12	.501	0.684	0.095 70	0.062 17	0.023 228	0.016 89	0.005 313	0.001 71	0.001 334	0.007 59	0.002 14
DCP13	.600	0.591	0.085 100	0.052 19	0.020 234	0.016 72	0.008 306	0.003 167	0.003 170	0.006 57	0.001 290
DCP14	.701	0.438	0.092 125	0.032 23	0.024 171	0.020 61	0.007 284	0.003 148	0.003 290	0.008 30	0.002 336
DCP15	.800	0.223	0.051 109	0.018 321	0.019 154	0.012 60	0.003 115	0.005 34	0.006 346	0.007 50	0.003 242
DCP16	.900	-0.029	0.045 26	0.030 294	0.015 141	0.001 270	0.003 158	0.007 11	0.009 139	0.012 26	0.000 268
DCP17	.969	-0.091	0.091 4	0.019 278	0.007 156	0.004 129	0.006 68	0.002 276	0.001 337	0.000 337	0.004 189

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.085	0.405	2.52	0.0	12.49	12189.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TAU	PET DAMP
137.3 (450.4)	48675. (1010.6)	0.648 07	-0.049	1.200	12.13	-0.00119	1.264	0.9

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.432	2.521 0	0.055 30	0.060 127	0.046 115	0.027 197	0.027 290	0.053 248	0.042 289	0.007 56
CN		1.014	0.145 104	0.016 107	0.028 90	0.014 84	0.010 312	0.007 290	0.009 224	0.007 192	0.002 89
CM		-0.008	0.035 193	0.009 93	0.007 147	0.003 163	0.004 100	0.002 109	0.002 350	0.001 20	0.000 180
DCP 1	.010	5.388	1.176 194	0.172 103	0.115 241	0.021 176	0.034 359	0.050 27	0.041 353	0.036 277	0.022 100
DCP 2	.020	4.436	0.872 162	0.248 130	0.110 204	0.028 168	0.034 263	0.043 17	0.040 351	0.034 301	0.017 72
DCP 3	.030	3.899	0.598 140	0.225 115	0.219 162	0.175 160	0.086 175	0.027 183	0.014 290	0.031 278	0.012 313
DCP 4	.049	3.217	0.568 153	0.225 108	0.121 137	0.096 135	0.004 59	0.044 267	0.048 248	0.021 246	0.015 259
DCP 5	.074	2.662	0.561 152	0.168 95	0.115 121	0.083 96	0.026 40	0.012 281	0.023 243	0.013 197	0.006 176
DCP 6	.099	2.331	0.514 146	0.124 80	0.105 115	0.055 68	0.020 319	0.014 259	0.029 249	0.016 208	0.009 221
DCP 7	.149	1.841	0.380 121	0.071 70	0.121 104	0.063 73	0.022 89	0.004 268	0.018 218	0.014 174	0.010 193
DCP 8	.200	1.555	0.304 106	0.048 62	0.099 89	0.028 76	0.022 81	0.002 47	0.016 160	0.021 130	0.011 99
DCP 9	.250	1.364	0.253 93	0.028 41	0.074 69	0.019 44	0.027 3	0.009 272	0.004 105	0.007 133	0.009 98
DCP10	.300	1.178	0.213 84	0.006 14	0.063 66	0.024 78	0.023 3	0.001 312	0.009 212	0.016 138	0.008 104
DCP11	.399	0.961	0.179 72	0.021 280	0.044 49	0.011 55	0.024 329	0.008 319	0.015 241	0.010 160	0.005 48
DCP12	.501	0.760	0.146 61	0.022 293	0.033 27	0.010 44	0.023 299	0.005 298	0.008 224	0.005 165	0.007 27
DCP13	.600	0.589	0.117 49	0.038 240	0.027 3	0.005 61	0.027 290	0.010 272	0.010 186	0.010 241	0.006 139
DCP14	.701	0.462	0.085 57	0.040 246	0.022 340	0.007 241	0.020 267	0.009 303	0.011 187	0.004 242	0.002 56
DCP15	.800	0.278	0.097 20	0.015 247	0.020 326	0.011 31	0.014 263	0.013 296	0.009 194	0.006 205	0.003 30
DCP16	.900	0.045	0.106 6	0.014 8	0.011 290	0.013 359	0.005 244	0.007 262	0.003 90	0.011 280	0.004 278
DCP17	.969	-0.010	0.091 0	0.011 18	0.007 242	0.002 328	0.004 235	0.005 306	0.004 137	0.004 227	0.006 267

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	REF.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.10	0.387	0.400	2.49	0.0	14.89	12108.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,AMAX	AERO DAMP	TAU	REF DAMP
134.9 (442.7)	47138. (984.5)	0.638 07	-0.086	1.174	14.00	-0.00199	2.000	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.846	2.604 0	0.053 10	0.029 287	0.014 114	0.014 316	0.017 281	0.006 2	0.012 277	0.011 340
CN		1.019	0.115 95	0.025 150	0.012 220	0.006 159	0.008 231	0.006 172	0.002 191	0.005 211	0.004 59
CM		-0.095	0.748 194	0.010 290	0.003 295	0.004 270	0.002 297	0.001 325	0.000 176	0.002 64	0.000 225
OCP 1	.010	4.689	1.274 191	0.098 305	0.024 149	0.044 303	0.057 285	0.053 229	0.019 283	0.029 130	0.015 297
OCP 2	.020	3.977	0.974 180	0.175 248	0.066 307	0.018 338	0.065 300	0.020 290	0.022 288	0.038 123	0.042 20
OCP 3	.030	3.600	0.813 174	0.267 221	0.167 284	0.080 324	0.047 338	0.021 339	0.013 198	0.014 141	0.038 42
OCP 4	.049	2.953	0.781 169	0.987 207	0.067 279	0.029 267	0.012 313	0.014 171	0.011 149	0.017 273	0.008 88
OCP 5	.074	2.427	0.592 157	0.095 236	0.037 231	0.050 261	0.031 247	0.021 193	0.002 331	0.008 185	0.008 214
OCP 6	.099	2.162	0.441 145	0.103 210	0.009 173	0.035 229	0.039 239	0.030 166	0.008 181	0.012 116	0.022 28
OCP 7	.149	1.769	0.305 125	0.127 197	0.024 240	0.027 262	0.027 290	0.012 161	0.020 174	0.012 152	0.009 186
OCP 8	.200	1.528	0.229 110	0.106 177	0.029 240	0.021 252	0.032 264	0.001 154	0.006 189	0.013 144	0.000 162
OCP 9	.250	1.365	0.203 96	0.095 162	0.032 232	0.013 146	0.031 227	0.018 195	0.004 123	0.007 102	0.004 100
OCP10	.300	1.199	0.186 70	0.076 141	0.029 235	0.014 199	0.029 273	0.014 195	0.006 145	0.002 226	0.006 67
OCP11	.399	1.018	0.195 51	0.049 125	0.036 208	0.036 158	0.011 107	0.013 210	0.013 264	0.012 228	0.012 112
OCP12	.501	0.797	0.177 43	0.037 100	0.022 164	0.016 88	0.008 159	0.011 172	0.010 14	0.009 279	0.009 49
OCP13	.600	0.636	0.164 34	0.026 64	0.015 136	0.015 100	0.007 167	0.010 137	0.005 90	0.010 249	0.005 287
OCP14	.721	0.527	0.160 23	0.027 35	0.013 120	0.023 86	0.007 152	0.004 4	0.005 91	0.006 279	0.004 317
OCP15	.800	0.378	0.136 18	0.034 29	0.019 96	0.012 94	0.006 148	0.009 52	0.002 158	0.006 286	0.007 17
OCP16	.900	0.136	0.095 19	0.026 32	0.033 95	0.009 96	0.006 97	0.009 22	0.005 294	0.009 205	0.002 149
OCP17	.949	0.038	0.044 21	0.011 34	0.007 24	0.005 88	0.002 23	0.005 60	0.002 251	0.006 212	0.002 166

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	REF.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.388	0.396	2.59	0.0	17.31	12109.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,AMAX	AERO DAMP	TAU	REF DAMP
133.5 (438.1)	46358. (968.2)	0.628 07	-0.104	1.137	16.19	-0.00199	2.199	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.310	2.926 0	0.061 17	0.034 215	0.019 148	0.021 24	0.017 7	0.019 73	0.006 151	0.002 51
CN		0.991	0.118 94	0.018 174	0.002 200	0.009 163	0.002 316	0.006 229	0.004 310	0.002 296	0.002 316
CM		-0.072	0.094 201	0.003 318	0.002 96	0.001 35	0.000 98	0.002 16	0.001 108	0.001 20	0.000 322
OCP 1	.010	3.929	0.725 182	0.160 305	0.068 97	0.045 237	0.035 15	0.015 54	0.006 296	0.020 293	0.008 33
OCP 2	.020	3.391	0.618 172	0.094 321	0.040 92	0.026 235	0.034 40	0.017 229	0.009 23	0.018 289	0.026 26
OCP 3	.030	3.067	0.497 167	0.051 355	0.036 288	0.038 164	0.030 9	0.021 292	0.004 10	0.007 240	0.011 29
OCP 4	.049	2.270	0.401 158	0.058 298	0.046 137	0.036 147	0.028 154	0.016 327	0.017 130	0.004 9	0.020 340
OCP 5	.074	1.911	0.433 139	0.068 196	0.029 141	0.032 147	0.016 191	0.014 290	0.006 35	0.013 125	0.022 305
OCP 6	.099	1.755	0.337 124	0.068 188	0.023 169	0.037 145	0.019 222	0.015 238	0.007 49	0.012 2	0.015 261
OCP 7	.149	1.536	0.269 112	0.047 180	0.009 119	0.024 132	0.009 274	0.010 195	0.005 259	0.012 355	0.005 267
OCP 8	.200	1.412	0.211 107	0.027 182	0.012 134	0.012 163	0.013 16	0.006 205	0.011 304	0.009 328	0.007 264
OCP 9	.250	1.332	0.188 91	0.024 176	0.018 71	0.007 144	0.008 19	0.009 239	0.004 337	0.004 86	0.006 345
OCP10	.300	1.214	0.164 80	0.017 104	0.012 20	0.003 78	0.007 17	0.003 347	0.010 324	0.007 309	0.005 27
OCP11	.399	1.075	0.148 68	0.019 165	0.009 265	0.002 278	0.008 281	0.008 301	0.016 301	0.002 218	0.007 255
OCP12	.501	0.897	0.132 54	0.018 178	0.012 242	0.005 170	0.009 324	0.013 347	0.002 129	0.004 128	0.004 167
OCP13	.600	0.741	0.132 44	0.020 169	0.011 249	0.010 170	0.002 18	0.009 237	0.002 42	0.006 179	0.002 41
OCP14	.701	0.640	0.122 35	0.016 157	0.005 238	0.006 172	0.005 212	0.012 202	0.007 298	0.004 252	0.004 341
OCP15	.800	0.482	0.116 29	0.011 150	0.008 298	0.004 202	0.003 323	0.014 179	0.004 289	0.004 302	0.004 34
OCP16	.900	0.298	0.074 35	0.006 114	0.008 323	0.007 214	0.003 280	0.012 211	0.006 260	0.010 159	0.003 189
OCP17	.949	0.061	0.027 47	0.006 91	0.006 221	0.004 175	0.004 170	0.008 231	0.005 307	0.006 207	0.001 288

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	22.99	0.088	0.394	2.54	0.0	19.84	12105.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TAU	EXT DAMP
132.7 (435.9)	46037. (961.5)	0.63E 07	-0.127	1.099	19.88	-0.00239	2.965	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		19.841	2.544 0	0.060 15	0.051 217	0.008 87	0.024 22	0.010 93	0.014 123	0.013 102	0.007 9
CN		0.078	0.111 94	0.016 153	0.006 113	0.002 304	0.003 336	0.007 359	0.003 348	0.006 125	0.004 250
CM		-0.096	0.023 221	0.005 262	0.002 240	0.002 200	0.001 197	0.001 150	0.001 157	0.000 179	0.002 45
DCP 1	.010	3.264	0.437 180	0.036 213	0.048 355	0.035 355	0.029 55	0.008 120	0.008 218	0.017 109	0.015 57
DCP 2	.020	2.695	0.616 175	0.060 128	0.035 318	0.022 11	0.012 319	0.003 344	0.023 138	0.019 146	0.029 85
DCP 3	.030	2.387	0.676 169	0.083 263	0.036 107	0.005 258	0.026 334	0.006 106	0.004 344	0.017 142	0.014 195
DCP 4	.049	1.898	0.271 138	0.060 258	0.046 145	0.020 226	0.018 280	0.015 23	0.005 128	0.026 151	0.015 312
DCP 5	.074	1.648	0.234 111	0.060 217	0.017 145	0.022 229	0.009 316	0.012 13	0.012 83	0.021 131	0.005 97
DCP 6	.099	1.434	0.290 104	0.048 205	0.016 169	0.018 205	0.011 259	0.018 31	0.005 239	0.013 127	0.002 300
DCP 7	.149	1.480	0.192 93	0.036 197	0.011 209	0.008 218	0.017 266	0.013 20	0.006 101	0.019 139	0.003 298
DCP 8	.200	1.362	0.159 93	0.025 216	0.007 207	0.014 303	0.009 344	0.010 347	0.009 8	0.014 168	0.002 20
DCP 9	.250	1.286	0.151 99	0.049 188	0.018 193	0.011 251	0.005 260	0.012 342	0.007 15	0.009 85	0.006 312
DCP10	.300	1.707	0.139 97	0.038 157	0.014 176	0.011 188	0.008 182	0.017 326	0.006 322	0.009 143	0.008 280
DCP11	.399	1.102	0.133 91	0.033 149	0.010 119	0.008 159	0.007 138	0.005 351	0.007 279	0.006 140	0.011 272
DCP12	.501	0.942	0.120 88	0.023 132	0.013 54	0.005 18	0.008 51	0.006 16	0.002 334	0.009 114	0.008 351
DCP13	.600	0.812	0.109 65	0.020 102	0.006 95	0.013 348	0.013 11	0.011 48	0.004 16	0.013 86	0.007 246
DCP14	.701	0.722	0.103 49	0.025 77	0.006 59	0.009 10	0.006 14	0.003 281	0.005 339	0.007 66	0.008 230
DCP15	.800	0.570	0.191 40	0.029 70	0.007 132	0.005 96	0.010 349	0.010 346	0.001 356	0.006 110	0.014 226
DCP16	.900	0.252	0.063 62	0.010 58	0.007 42	0.005 38	0.004 245	0.008 297	0.004 324	0.008 244	0.007 188
DCP17	.969	0.070	0.029 70	0.003 128	0.019 16	0.003 309	0.001 162	0.005 164	0.002 105	0.004 214	0.005 121

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	45.67	0.168	0.409	2.84	0.0	0.02	12107.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TAU	EXT DAMP
138.8 (455.3)	49379. (1031.3)	0.65E 07	-0.028	0.356	2.99	-0.00874	0.846	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.022	2.840 0	0.088 350	0.199 251	0.034 98	0.021 71	0.010 191	0.011 127	0.009 189	0.011 342
CN		0.123	0.225 357	0.005 1	0.004 312	0.009 117	0.002 271	0.001 262	0.009 172	0.001 44	0.002 76
CM		-0.014	0.012 296	0.001 240	0.001 278	0.001 305	0.001 133	0.000 118	0.000 47	0.000 297	0.000 252
DCP 1	.010	-0.981	1.993 343	0.054 19	0.026 242	0.023 94	0.009 143	0.002 256	0.004 51	0.015 78	0.024 299
DCP 2	.020	-0.746	1.196 348	0.026 342	0.022 266	0.028 122	0.005 205	0.005 240	0.002 151	0.010 15	0.005 4
DCP 3	.030	-0.073	0.998 347	0.023 306	0.018 267	0.018 129	0.003 166	0.003 217	0.004 236	0.004 310	0.001 294
DCP 4	.049	0.163	0.916 348	0.020 302	0.019 280	0.017 98	0.003 185	0.003 157	0.004 72	0.004 7	0.004 65
DCP 5	.074	0.279	0.671 348	0.015 323	0.014 280	0.016 84	0.004 175	0.004 267	0.003 177	0.007 313	0.002 62
DCP 6	.099	0.356	0.567 350	0.012 329	0.014 293	0.018 97	0.004 207	0.001 262	0.004 241	0.005 324	0.003 89
DCP 7	.149	0.251	0.421 351	0.010 11	0.015 289	0.015 131	0.004 158	0.002 277	0.001 305	0.001 325	0.002 143
DCP 8	.200	0.208	0.344 358	0.011 347	0.007 307	0.017 101	0.002 142	0.005 269	0.004 44	0.004 356	0.006 349
DCP 9	.250	0.190	0.295 355	0.011 331	0.007 301	0.009 128	0.005 276	0.003 89	0.004 140	0.006 65	0.002 169
DCP10	.300	0.182	0.268 356	0.003 26	0.003 332	0.009 141	0.003 274	0.003 140	0.001 224	0.003 99	0.001 279
DCP11	.399	0.173	0.196 7	0.003 65	0.001 335	0.007 131	0.006 320	0.001 115	0.002 111	0.005 177	0.002 102
DCP12	.501	0.123	0.151 11	0.005 21	0.003 344	0.007 118	0.004 196	0.002 162	0.003 128	0.007 181	0.007 111
DCP13	.600	0.137	0.117 18	0.002 42	0.004 343	0.002 154	0.003 296	0.004 215	0.002 143	0.005 30	0.003 191
DCP14	.701	0.209	0.091 21	0.005 85	0.004 9	0.002 118	0.004 328	0.006 316	0.005 6	0.002 269	0.003 42
DCP15	.800	0.293	0.050 32	0.006 7	0.001 43	0.005 99	0.003 312	0.003 224	0.007 229	0.003 73	0.004 5
DCP16	.900	-0.089	0.016 68	0.001 42	0.007 46	0.011 121	0.003 301	0.007 312	0.001 270	0.003 278	0.003 89
DCP17	.969	-0.041	0.015 181	0.006 1	0.001 265	0.008 124	0.005 316	0.005 98	0.003 73	0.004 119	0.002 276

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.70	0.171	0.694	2.84	0.0	2.42	12107.2	21

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
136.5 (447.7)	48287. (1008.5)	0.648 07	-0.726	0.693	9.31	-0.00076	0.850	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.418	2.837	0	0.087	357	0.086	261	0.024	90	0.035	64	0.013	41	0.014	196	0.009	299	0.007	352
CN		0.372	0.228	357	0.007	17	0.009	330	0.007	2	0.001	64	0.001	183	0.001	276	0.002	288	0.001	42
CM		-0.011	0.012	294	0.001	244	0.001	291	0.002	173	0.001	196	0.000	258	0.000	114	0.001	130	0.000	218
DCP 1	.010	1.094	1.519	343	0.031	352	0.022	279	0.011	3	0.007	188	0.002	36	0.006	188	0.002	148	0.006	332
DCP 2	.020	0.918	1.219	348	0.029	345	0.016	296	0.010	9	0.005	170	0.004	166	0.004	202	0.006	178	0.005	5
DCP 3	.030	1.096	1.245	347	0.022	330	0.019	292	0.008	16	0.006	206	0.002	73	0.005	196	0.003	62	0.004	53
DCP 4	.049	1.040	0.955	348	0.016	323	0.013	311	0.007	65	0.004	217	0.002	185	0.002	183	0.002	109	0.001	28
DCP 5	.074	1.008	0.687	345	0.015	316	0.011	291	0.009	38	0.001	178	0.004	181	0.004	193	0.002	24	0.002	30
DCP 6	.099	0.976	0.576	349	0.016	5	0.016	308	0.001	138	0.008	133	0.002	333	0.006	239	0.006	282	0.003	69
DCP 7	.149	0.711	0.422	352	0.008	318	0.006	4	0.005	78	0.006	104	0.005	149	0.009	58	0.005	106	0.003	353
DCP 8	.200	0.579	0.356	357	0.007	5	0.006	296	0.010	46	0.006	110	0.005	214	0.003	289	0.004	8	0.005	131
DCP 9	.250	0.493	0.295	355	0.013	25	0.009	336	0.004	326	0.002	158	0.002	290	0.002	325	0.004	230	0.002	99
DCP10	.300	0.456	0.247	356	0.011	6	0.012	316	0.008	339	0.003	154	0.004	133	0.002	277	0.002	317	0.003	4
DCP11	.399	0.390	0.199	7	0.013	32	0.009	339	0.011	359	0.004	61	0.004	244	0.005	4	0.005	264	0.005	100
DCP12	.501	0.297	0.152	12	0.008	52	0.002	333	0.008	4	0.002	260	0.001	93	0.001	178	0.005	230	0.001	311
DCP13	.600	0.264	0.115	14	0.005	54	0.004	344	0.012	330	0.005	336	0.008	313	0.007	263	0.001	297	0.002	60
DCP14	.701	0.288	0.081	23	0.004	27	0.006	21	0.005	355	0.004	31	0.002	37	0.005	216	0.004	36	0.002	92
DCP15	.800	0.140	0.148	31	0.008	68	0.003	76	0.014	22	0.007	147	0.005	149	0.006	27	0.005	280	0.005	331
DCP16	.900	-0.074	0.023	44	0.007	68	0.006	18	0.004	330	0.008	82	0.001	108	0.004	141	0.004	11	0.001	71
DCP17	.969	-0.057	0.016	148	0.006	308	0.007	248	0.011	350	0.001	343	0.002	69	0.007	9	0.005	287	0.005	153

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.172	0.799	2.84	0.0	4.94	12107.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
135.0 (442.3)	47320. (988.3)	0.648 07	-0.024	0.870	7.94	-0.00075	0.824	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.939	2.837	0	0.076	357	0.065	257	0.079	102	0.028	70	0.013	67	0.014	200	0.012	179	0.010	64
CN		0.628	0.228	357	0.005	22	0.002	314	0.016	113	0.001	241	0.001	69	0.001	280	0.001	186	0.002	89
CM		-0.006	0.012	302	0.001	273	0.000	311	0.005	280	0.001	31	0.000	261	0.000	110	0.001	358	0.001	294
DCP 1	.010	2.735	1.582	343	0.050	270	0.010	146	0.021	98	0.006	233	0.007	331	0.010	273	0.004	222	0.006	86
DCP 2	.020	2.242	1.232	348	0.022	331	0.005	296	0.019	142	0.002	203	0.010	10	0.011	291	0.002	310	0.003	7
DCP 3	.030	2.138	1.042	348	0.021	351	0.010	313	0.010	100	0.005	169	0.010	15	0.008	264	0.000	328	0.004	236
DCP 4	.049	2.001	0.881	348	0.016	331	0.012	300	0.017	160	0.002	135	0.000	78	0.002	253	0.007	357	0.003	113
DCP 5	.074	1.773	0.702	349	0.013	352	0.010	305	0.014	158	0.001	23	0.003	324	0.002	3	0.004	332	0.003	82
DCP 6	.099	1.612	0.574	351	0.012	18	0.005	311	0.018	178	0.002	138	0.002	142	0.005	47	0.005	348	0.006	22
DCP 7	.149	1.187	0.451	351	0.014	20	0.004	310	0.011	161	0.001	307	0.001	141	0.003	234	0.003	277	0.001	45
DCP 8	.200	0.971	0.350	358	0.004	4	0.007	348	0.015	175	0.002	314	0.004	71	0.001	288	0.002	21	0.005	27
DCP 9	.250	0.829	0.288	357	0.009	14	0.004	1	0.018	86	0.003	76	0.001	23	0.007	303	0.001	126	0.001	219
DCP10	.300	0.738	0.245	359	0.008	46	0.005	261	0.017	59	0.005	325	0.002	171	0.001	307	0.001	101	0.004	37
DCP11	.399	0.610	0.195	9	0.006	34	0.003	347	0.024	112	0.003	13	0.002	299	0.001	83	0.007	168	0.002	226
DCP12	.501	0.454	0.149	11	0.002	353	0.002	293	0.018	114	0.007	284	0.001	149	0.001	239	0.009	162	0.003	114
DCP13	.600	0.384	0.110	17	0.006	23	0.004	296	0.018	96	0.003	244	0.007	67	0.001	132	0.006	200	0.003	59
DCP14	.701	0.378	0.074	26	0.007	96	0.007	345	0.018	106	0.003	207	0.002	222	0.004	240	0.003	116	0.004	127
DCP15	.800	0.189	0.045	37	0.004	104	0.004	171	0.017	114	0.005	167	0.002	339	0.001	49	0.001	319	0.009	129
DCP16	.900	-0.063	0.018	54	0.008	18	0.004	158	0.022	96	0.004	215	0.003	272	0.009	272	0.008	213	0.006	123
DCP17	.969	-0.064	0.010	201	0.007	188	0.001	264	0.020	93	0.004	174	0.005	77	0.006	335	0.003	186	0.004	19

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REF.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.174	0.396	2.93	0.0	7.40	12107.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TDR	EXT DAMP
133.6 (438.2)	46578. (972.8)	9.63E 07	-0.916	1.082	10.27	-0.00105	1.147	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.396	2.830	0	0.277	1	0.096	264	0.027	60	0.029	65	0.013	58	0.013	208	0.003	156	0.013	47
CN		0.872	0.211	4	0.016	9	0.002	224	0.019	357	0.001	307	0.001	191	0.001	317	0.002	104	0.002	110
CM		0.002	0.018	302	0.002	188	0.002	330	0.005	164	0.000	233	0.000	359	0.001	207	0.000	218	0.000	330
DCP 1	.010	4.677	1.982	344	0.081	274	0 42	310	0.073	214	0.016	202	0.028	177	0.011	117	0.008	124	0.034	48
DCP 2	.020	3.959	1.269	351	0.135	278	0.45	166	0.141	68	0.056	325	0.021	13	0.039	200	0.022	219	0.078	147
DCP 3	.039	3.196	0.952	350	0.256	38	0.036	324	0.014	70	0.015	288	0.011	253	0.010	133	0.012	128	0.006	44
DCP 4	.049	2.991	0.782	351	0.066	19	0.036	295	0.004	357	0.010	196	0.005	122	0.004	211	0.038	117	0.006	44
DCP 5	.074	2.590	0.442	342	0.039	29	0.015	318	0.001	84	0.004	212	0.002	154	0.003	215	0.004	153	0.001	29
DCP 6	.099	2.709	0.531	354	0.093	27	0.011	329	0.005	79	0.004	123	0.009	188	0.002	31	0.006	176	0.002	97
DCP 7	.149	1.651	0.400	355	0.022	9	0.014	263	0.004	66	0.003	148	0.004	260	0.002	227	0.004	137	0.007	43
DCP 8	.200	1.338	0.327	2	0.015	40	0.004	295	0.007	113	0.004	325	0.002	66	0.005	225	0.006	120	0.003	199
DCP 9	.250	1.137	0.275	2	0.016	6	0.005	336	0.017	332	0.001	249	0.002	87	0.001	181	0.009	34	0.036	122
DCP10	.300	0.990	0.225	4	0.015	349	0.006	193	0.014	327	0.001	281	0.006	145	0.006	238	0.002	44	0.003	72
DCP11	.349	0.916	0.189	16	0.016	12	0.009	159	0.020	4	0.000	82	0.004	251	0.004	2	0.007	147	0.001	110
DCP12	.501	0.659	0.142	21	0.012	17	0.003	98	0.015	359	0.002	95	0.001	293	0.002	227	0.002	351	0.001	68
DCP13	.600	0.604	0.107	32	0.014	20	0.013	163	0.017	351	0.003	84	0.004	214	0.003	39	0.001	221	0.004	354
DCP14	.701	0.445	0.078	54	0.018	22	0.004	127	0.015	339	0.004	330	0.001	32	0.001	86	0.003	53	0.009	218
DCP15	.800	0.229	0.059	72	0.013	4	0.004	154	0.018	357	0.002	330	0.004	93	0.001	357	0.001	148	0.017	154
DCP16	.900	-0.041	0.022	83	0.006	344	0.012	295	0.020	336	0.003	251	0.003	179	0.004	26	0.004	39	0.002	35
DCP17	.969	-0.165	0.008	116	0.009	304	0.012	126	0.016	7	0.005	126	0.005	322	0.009	9	0.002	96	0.006	104

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REF.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.60	0.175	0.394	2.79	0.0	9.89	12187.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TDR	EXT DAMP
132.9 (435.9)	46214. (965.2)	9.63E 07	-0.915	1.297	12.20	-0.00120	1.319	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.892	2.793	0	0.118	17	0.110	258	0.031	181	0.041	62	0.021	56	0.010	295	0.005	252	0.008	28
CN		0.995	0.236	46	0.066	322	0.039	153	0.011	280	0.003	170	0.001	210	0.002	206	0.003	359	0.002	23
CM		0.007	0.018	259	0.016	59	0.009	279	0.001	74	0.002	209	0.001	84	0.000	98	0.001	145	0.001	288
DCP 1	.010	5.491	0.676	13	0.692	81	0.193	8	0.080	98	0.104	34	0.063	309	0.049	212	0.026	182	0.020	185
DCP 2	.020	4.270	0.880	30	0.347	28	0.232	1	0.190	319	0.052	357	0.125	140	0.083	294	0.033	269	0.086	279
DCP 3	.030	3.809	0.644	31	0.338	40	0.230	343	0.200	295	0.133	245	0.073	211	0.046	202	0.037	179	0.015	189
DCP 4	.049	3.369	0.569	40	0.301	15	0.147	288	0.059	242	0.041	241	0.050	204	0.033	161	0.020	154	0.017	122
DCP 5	.074	2.816	0.410	49	0.243	16	0.100	274	0.011	204	0.029	256	0.036	188	0.027	130	0.016	118	0.020	58
DCP 6	.099	2.490	0.448	46	0.229	354	0.105	245	0.006	170	0.042	228	0.051	135	0.021	46	0.007	89	0.020	28
DCP 7	.149	1.916	0.441	38	0.202	327	0.083	216	0.013	346	0.045	199	0.037	112	0.015	107	0.037	69	0.099	338
DCP 8	.200	1.562	0.388	40	0.154	322	0.099	292	0.023	306	0.052	184	0.037	86	0.009	1	0.009	73	0.019	322
DCP 9	.250	1.323	0.355	37	0.127	302	0.077	177	0.021	232	0.035	122	0.028	19	0.012	296	0.015	343	0.011	293
DCP10	.300	1.150	0.308	39	0.113	298	0.060	174	0.015	177	0.024	79	0.020	333	0.008	197	0.012	302	0.006	187
DCP11	.399	0.926	0.257	50	0.090	299	0.031	151	0.009	256	0.016	91	0.012	356	0.006	273	0.009	316	0.005	209
DCP12	.501	0.687	0.215	53	0.071	284	0.041	123	0.007	346	0.010	41	0.008	292	0.004	294	0.005	280	0.004	123
DCP13	.600	0.527	0.178	65	0.059	280	0.036	99	0.010	316	0.011	14	0.017	250	0.008	146	0.009	7	0.002	245
DCP14	.701	0.434	0.153	86	0.042	274	0.036	68	0.017	273	0.008	29	0.009	221	0.004	12	0.007	292	0.004	120
DCP15	.800	0.229	0.101	74	0.044	247	0.036	78	0.008	268	0.005	23	0.005	255	0.007	257	0.003	11	0.006	61
DCP16	.900	-0.015	0.071	23	0.043	219	0.018	59	0.010	283	0.008	309	0.004	143	0.001	176	0.005	244	0.006	86
DCP17	.969	-0.052	0.037	359	0.018	219	0.005	7	0.010	142	0.008	271	0.004	174	0.004	265	0.009	42	0.006	71

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.96	0.188	0.406	2.67	0.0	12.47	12109.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
138.1 (453.2)	48809. (1019.4)	0.648 07	-0.099	1.338	19.95	-0.00121	1.379	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.466	2.669 0	0.078 58	0.168 39	0.042 112	0.098 37	0.011 142	0.011 78	0.012 161	0.017 277
CN		1.015	0.269 78	0.038 43	0.022 0	0.004 136	0.010 227	0.000 202	0.006 96	0.001 281	0.002 182
CM		-0.015	0.240 232	0.016 94	0.012 105	0.007 30	0.005 39	0.003 342	0.003 247	0.003 142	0.000 147
RCP 1	.010	5.267	1.051 169	0.402 100	0.159 300	0.059 284	0.025 249	0.070 325	0.002 298	0.024 295	0.029 325
RCP 2	.020	4.101	0.829 122	0.487 115	0.033 169	0.057 276	0.071 299	0.057 295	0.066 298	0.025 329	0.038 334
RCP 3	.030	3.580	0.602 150	0.515 130	0.317 118	0.157 120	0.097 173	0.096 193	0.053 219	0.036 227	0.024 270
RCP 4	.040	3.208	0.686 172	0.345 75	0.079 67	0.085 109	0.061 125	0.026 147	0.017 211	0.032 234	0.032 236
RCP 5	.074	2.665	0.696 121	0.283 58	0.053 61	0.071 85	0.037 82	0.011 99	0.007 189	0.024 200	0.019 207
RCP 6	.090	2.348	0.421 114	0.204 48	0.093 107	0.103 67	0.040 74	0.027 94	0.019 98	0.034 160	0.032 196
RCP 7	.149	1.825	0.543 97	0.144 37	0.121 76	0.083 30	0.023 47	0.015 119	0.032 117	0.023 110	0.021 113
RCP 8	.200	1.440	0.459 87	0.102 34	0.101 91	0.051 12	0.010 346	0.009 215	0.013 160	0.034 140	0.028 108
RCP 9	.250	1.348	0.476 77	0.080 35	0.119 95	0.029 342	0.024 343	0.024 307	0.009 342	0.013 291	0.009 68
RCP10	.300	1.159	0.389 67	0.054 40	0.090 346	0.029 339	0.007 264	0.042 264	0.014 312	0.023 114	0.017 248
RCP11	.399	0.989	0.354 65	0.068 5	0.085 358	0.016 293	0.038 285	0.012 282	0.007 220	0.008 19	0.008 330
RCP12	.501	0.786	0.288 56	0.039 321	0.068 332	0.026 342	0.032 257	0.021 226	0.020 191	0.038 61	0.034 294
RCP13	.600	0.613	0.252 53	0.038 278	0.054 319	0.039 298	0.031 231	0.020 181	0.029 110	0.028 356	0.010 294
RCP14	.701	0.479	0.195 52	0.053 259	0.046 284	0.034 182	0.029 201	0.021 155	0.027 60	0.011 303	0.007 298
RCP15	.800	0.295	0.169 32	0.043 271	0.044 295	0.031 147	0.021 170	0.007 174	0.018 56	0.011 293	0.006 88
RCP16	.900	0.060	0.140 14	0.031 293	0.032 242	0.020 187	0.009 153	0.019 128	0.010 356	0.009 282	0.001 308
RCP17	.969	-0.008	0.065 4	0.014 320	0.018 246	0.019 203	0.010 186	0.011 100	0.007 321	0.013 277	0.004 38

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.62	0.173	0.399	2.65	0.0	14.89	12109.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
134.6 (441.6)	47009. (981.8)	0.639 07	-0.141	1.425	19.49	-0.00138	1.522	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.895	2.651 0	0.012 161	0.091 121	0.031 41	0.032 7	0.003 133	0.022 145	0.003 178	0.007 323
CN		1.029	0.259 78	0.075 86	0.033 67	0.019 19	0.005 12	0.005 1	0.005 67	0.000 18	0.001 190
CM		-0.041	0.269 196	0.023 187	0.014 162	0.010 159	0.002 128	0.002 139	0.001 95	0.002 184	0.001 8
RCP 1	.010	6.845	1.391 171	0.588 245	0.129 120	0.069 41	0.083 67	0.029 74	0.030 156	0.022 288	0.022 282
RCP 2	.020	3.917	1.155 157	0.360 179	0.091 128	0.077 57	0.059 34	0.031 126	0.036 116	0.036 320	0.028 296
RCP 3	.030	3.347	1.079 172	0.430 160	0.178 148	0.138 260	0.057 283	0.022 17	0.039 43	0.029 7	0.019 112
RCP 4	.040	2.920	0.959 164	0.278 129	0.159 159	0.090 167	0.067 275	0.032 44	0.036 38	0.038 12	0.032 136
RCP 5	.074	2.619	0.777 137	0.153 127	0.137 139	0.045 145	0.012 171	0.013 136	0.023 83	0.038 62	0.012 41
RCP 6	.090	2.157	0.679 121	0.160 139	0.115 114	0.036 188	0.015 156	0.019 81	0.017 18	0.018 28	0.000 84
RCP 7	.149	1.760	0.653 99	0.187 128	0.099 107	0.067 152	0.017 79	0.015 327	0.028 307	0.028 334	0.018 327
RCP 8	.200	1.506	0.495 88	0.106 117	0.097 102	0.064 117	0.013 85	0.006 339	0.026 235	0.014 316	0.003 3
RCP 9	.250	1.353	0.398 77	0.160 105	0.073 93	0.046 68	0.017 129	0.007 325	0.030 241	0.027 148	0.019 10
RCP10	.300	1.214	0.381 66	0.153 87	0.060 59	0.036 70	0.015 61	0.015 186	0.019 130	0.000 199	0.006 92
RCP11	.399	1.048	0.360 58	0.131 79	0.046 44	0.042 45	0.018 88	0.015 99	0.000 198	0.016 121	0.004 320
RCP12	.501	0.892	0.330 47	0.116 57	0.070 24	0.046 5	0.018 24	0.015 8	0.006 161	0.011 97	0.017 220
RCP13	.600	0.676	0.295 41	0.090 36	0.064 10	0.048 1	0.018 351	0.024 18	0.009 336	0.021 29	0.008 280
RCP14	.701	0.559	0.272 30	0.085 1	0.044 339	0.036 323	0.014 313	0.013 311	0.002 293	0.017 340	0.007 170
RCP15	.800	0.392	0.241 21	0.077 354	0.042 332	0.028 332	0.018 290	0.010 294	0.004 301	0.012 349	0.002 145
RCP16	.900	0.149	0.146 12	0.066 351	0.046 319	0.036 306	0.013 241	0.008 290	0.004 166	0.010 277	0.011 60
RCP17	.969	0.028	0.053 27	0.027 5	0.029 317	0.021 336	0.003 276	0.009 17	0.008 172	0.016 39	0.012 223

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.65	0.174	0.399	2.67	0.0	17.36	12109.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TRD	FIT DAMP
133.6 (438.4)	46477. (970.7)	0.63E 07	-0.139	1.266	17.63	-0.00239	2.619	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.364	2.679 0	0.044 11	0.041 197	0.045 133	0.012 18	0.007 8	0.015 174	0.009 187	0.008 329
CN		1.021	0.206 89	0.009 58	0.011 115	0.007 65	0.007 239	0.001 331	0.003 74	0.003 14	0.002 133
CM		-0.074	0.052 217	0.011 192	0.001 248	0.002 298	0.003 60	0.000 247	0.002 279	0.001 314	0.001 198
DCP 1	.010	4.148	0.997 188	0.116 286	0.105 84	0.023 14	0.010 14	0.050 62	0.009 94	0.025 356	0.034 303
DCP 2	.020	3.335	0.960 173	0.038 105	0.044 40	0.040 41	0.039 3	0.037 41	0.023 69	0.012 90	0.007 180
DCP 3	.030	2.828	0.947 170	0.062 347	0.016 172	0.034 32	0.020 122	0.015 299	0.019 118	0.006 260	0.030 177
DCP 4	.049	2.369	0.627 150	0.059 184	0.047 177	0.020 15	0.013 299	0.007 67	0.009 231	0.020 222	0.022 211
DCP 5	.074	1.949	0.405 123	0.048 186	0.038 89	0.011 267	0.007 301	0.012 0	0.007 294	0.005 241	0.014 203
DCP 6	.099	1.811	0.368 102	0.067 164	0.013 129	0.017 264	0.017 313	0.029 353	0.002 318	0.004 127	0.030 118
DCP 7	.149	1.611	0.302 91	0.068 118	0.035 123	0.019 175	0.030 225	0.018 273	0.008 323	0.003 329	0.014 79
DCP 8	.200	1.473	0.290 84	0.049 124	0.039 123	0.009 296	0.014 358	0.004 10	0.007 348	0.029 45	0.007 176
DCP 9	.250	1.378	0.266 85	0.060 101	0.012 92	0.010 162	0.014 107	0.011 190	0.015 196	0.012 19	0.016 319
DCP10	.300	1.298	0.209 74	0.076 97	0.018 108	0.004 25	0.024 153	0.032 215	0.014 149	0.029 69	0.030 204
DCP11	.399	1.119	0.274 73	0.071 76	0.019 122	0.013 97	0.012 219	0.007 263	0.005 206	0.023 311	0.014 138
DCP12	.501	0.977	0.278 63	0.062 34	0.017 63	0.015 68	0.009 278	0.011 45	0.014 105	0.017 274	0.018 120
DCP13	.600	0.765	0.253 54	0.055 17	0.006 35	0.014 139	0.004 239	0.019 69	0.017 86	0.009 253	0.014 49
DCP14	.701	0.659	0.222 44	0.047 358	0.004 228	0.004 40	0.016 271	0.004 331	0.008 50	0.001 189	0.017 350
DCP15	.800	0.502	0.189 40	0.038 357	0.007 116	0.012 77	0.019 261	0.001 23	0.011 166	0.017 139	0.011 303
DCP16	.900	0.215	0.136 47	0.032 353	0.009 83	0.010 17	0.014 202	0.005 291	0.007 41	0.013 58	0.005 228
DCP17	.969	0.050	0.058 67	0.007 17	0.002 97	0.008 99	0.003 173	0.005 53	0.001 253	0.006 129	0.010 30

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.99	0.175	0.399	2.71	0.0	19.87	12109.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TRD	FIT DAMP
132.6 (435.2)	45927. (959.2)	0.63E 07	-0.156	1.255	19.67	-0.00309	3.357	9.9

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		19.871	2.709 0	0.069 6	0.048 200	0.038 161	0.027 30	0.010 24	0.011 184	0.014 129	0.005 343
CN		1.012	0.208 84	0.009 69	0.010 156	0.013 227	0.009 88	0.012 116	0.008 99	0.007 176	0.001 160
CM		-0.096	0.052 233	0.008 205	0.003 215	0.002 47	0.003 254	0.004 289	0.001 273	0.002 333	0.001 54
DCP 1	.010	3.374	0.882 191	0.084 74	0.025 66	0.041 176	0.026 242	0.015 341	0.016 3	0.017 223	0.030 175
DCP 2	.020	2.836	0.801 171	0.095 63	0.071 209	0.045 150	0.012 302	0.007 40	0.009 288	0.029 224	0.011 211
DCP 3	.030	2.489	0.747 149	0.138 266	0.035 73	0.021 266	0.001 136	0.002 153	0.021 7	0.012 146	0.011 269
DCP 4	.049	2.000	0.337 138	0.075 230	0.071 198	0.042 238	0.025 262	0.018 323	0.021 356	0.011 31	0.013 89
DCP 5	.074	1.755	0.273 108	0.061 184	0.093 179	0.040 225	0.017 94	0.017 169	0.006 312	0.009 289	0.017 340
DCP 6	.099	1.693	0.262 99	0.070 184	0.030 184	0.029 211	0.013 354	0.022 89	0.009 83	0.008 313	0.006 64
DCP 7	.149	1.542	0.236 89	0.040 161	0.039 160	0.026 233	0.011 179	0.007 166	0.011 116	0.003 259	0.008 215
DCP 8	.200	1.430	0.217 91	0.032 196	0.032 222	0.020 256	0.015 86	0.013 81	0.016 127	0.007 167	0.011 180
DCP 9	.250	1.347	0.250 88	0.027 197	0.023 227	0.011 254	0.005 91	0.011 171	0.001 3	0.009 275	0.008 82
DCP10	.300	1.252	0.251 81	0.012 172	0.024 203	0.013 242	0.010 42	0.015 76	0.012 153	0.007 259	0.006 31
DCP11	.399	1.154	0.272 82	0.023 69	0.024 166	0.011 238	0.011 147	0.018 144	0.017 111	0.010 217	0.008 60
DCP12	.501	0.977	0.274 72	0.036 58	0.035 127	0.010 248	0.025 84	0.018 159	0.014 126	0.015 168	0.010 60
DCP13	.600	0.828	0.257 65	0.027 48	0.020 76	0.016 176	0.018 130	0.020 149	0.008 94	0.017 163	0.006 350
DCP14	.701	0.729	0.233 57	0.031 38	0.013 19	0.006 208	0.024 82	0.025 118	0.010 38	0.010 134	0.004 314
DCP15	.800	0.567	0.195 56	0.032 16	0.017 11	0.008 210	0.012 72	0.026 100	0.009 162	0.006 160	0.010 229
DCP16	.900	0.258	0.159 60	0.033 358	0.017 6	0.015 206	0.012 2	0.013 56	0.001 259	0.005 115	0.010 212
DCP17	.969	0.067	0.076 68	0.010 1	0.002 333	0.010 210	0.007 325	0.010 60	0.011 41	0.007 183	0.009 237

POORER PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
7.0	68.99	0.252	0.407	3.15	0.0	0.06	12111.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAR	EXT DAMP
138.2 (453.3)	48953. (1022.4)	0.64E 07	-0.035	0.340	3.25	-0.00069	0.789	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.097	3.147 0	0.136 308	0.098 191	0.022 113	0.012 216	0.028 59	0.008 32	0.004 189	0.000 82
CN		0.112	0.222 5	0.010 331	0.004 267	0.002 217	0.002 214	0.001 120	0.002 77	0.001 226	0.001 300
CM		-0.016	0.017 293	0.001 238	0.001 212	0.001 76	0.000 309	0.000 294	0.000 298	0.000 322	0.000 178
RCP 1	.010	-1.137	1.980 342	0.047 299	0.050 181	0.010 35	0.026 150	0.002 259	0.023 318	0.011 92	0.009 182
RCP 2	.020	-0.364	1.197 350	0.053 304	0.026 229	0.011 170	0.012 206	0.007 53	0.010 17	0.003 315	0.005 111
RCP 3	.030	-0.085	1.000 349	0.091 288	0.020 229	0.010 172	0.012 222	0.004 85	0.003 329	0.029 297	0.004 183
RCP 4	.040	0.161	0.821 351	0.037 298	0.021 231	0.004 161	0.008 253	0.005 80	0.004 308	0.003 176	0.001 316
RCP 5	.050	0.272	0.670 351	0.029 299	0.022 230	0.004 73	0.006 198	0.002 358	0.004 96	0.007 284	0.004 164
RCP 6	.059	0.344	0.572 353	0.023 305	0.019 247	0.004 80	0.009 187	0.004 65	0.001 4	0.005 297	0.002 72
RCP 7	.149	0.742	0.420 356	0.013 346	0.011 261	0.006 198	0.002 239	0.001 353	0.006 57	0.004 268	0.004 190
RCP 8	.200	0.189	0.349 5	0.019 330	0.011 268	0.007 270	0.003 150	0.004 46	0.004 56	0.004 298	0.004 293
RCP 9	.250	0.181	0.291 2	0.018 331	0.012 273	0.006 158	0.003 110	0.004 315	0.003 136	0.004 159	0.002 184
RCP10	.300	0.185	0.251 6	0.019 326	0.006 239	0.003 216	0.005 320	0.004 143	0.003 49	0.003 278	0.003 319
RCP11	.349	0.169	0.207 20	0.012 343	0.003 342	0.004 136	0.005 266	0.004 172	0.004 81	0.001 300	0.000 326
RCP12	.501	0.120	0.157 76	0.008 347	0.004 274	0.004 236	0.004 308	0.006 203	0.002 100	0.001 315	0.003 309
RCP13	.600	0.138	0.118 34	0.009 347	0.006 318	0.002 208	0.001 179	0.005 124	0.006 120	0.006 101	0.005 270
RCP14	.701	0.202	0.093 43	0.006 31	0.003 91	0.005 268	0.002 151	0.003 219	0.001 259	0.005 101	0.004 77
RCP15	.800	0.096	0.063 58	0.008 33	0.004 13	0.001 33	0.005 115	0.003 334	0.002 349	0.001 104	0.003 22
RCP16	.900	-0.090	0.026 77	0.003 18	0.008 35	0.003 239	0.001 237	0.007 47	0.005 135	0.005 217	0.006 167
RCP17	.969	-0.047	0.010 180	0.008 154	0.004 157	0.002 79	0.010 118	0.001 311	0.003 350	0.004 9	0.003 357

POORER PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.92	0.256	0.409	3.14	0.0	2.49	12111.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAR	EXT DAMP
136.4 (447.5)	48144. (1005.5)	0.64E 07	-0.028	0.595	5.73	-0.00066	0.756	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.486	3.141 0	0.127 296	0.072 203	0.014 120	0.011 59	0.030 85	0.005 58	0.009 199	0.007 327
CN		0.367	0.227 4	0.011 323	0.001 359	0.002 282	0.001 197	0.002 196	0.001 123	0.001 293	0.001 185
CM		-0.011	0.017 292	0.002 216	0.001 225	0.001 121	0.001 68	0.001 21	0.000 348	0.000 54	0.000 0
RCP 1	.010	0.745	1.460 344	0.060 285	0.022 290	0.028 139	0.008 26	0.001 11	0.002 145	0.000 58	0.002 359
RCP 2	.020	0.926	1.223 350	0.050 293	0.000 225	0.010 187	0.009 100	0.007 95	0.005 319	0.002 67	0.005 191
RCP 3	.030	1.009	1.046 349	0.043 287	0.011 203	0.005 154	0.004 98	0.004 72	0.004 353	0.001 237	0.005 129
RCP 4	.040	1.058	0.861 350	0.034 296	0.007 185	0.007 198	0.006 159	0.005 93	0.004 11	0.007 298	0.001 146
RCP 5	.074	1.012	0.691 350	0.032 290	0.006 240	0.002 55	0.009 192	0.004 98	0.002 277	0.004 8	0.003 133
RCP 6	.099	0.976	0.580 353	0.023 317	0.012 299	0.007 214	0.012 108	0.002 41	0.001 299	0.011 301	0.007 294
RCP 7	.149	0.706	0.425 356	0.022 283	0.004 140	0.003 200	0.008 90	0.010 94	0.003 49	0.008 63	0.003 287
RCP 8	.200	0.569	0.358 4	0.017 339	0.005 330	0.004 284	0.003 24	0.003 98	0.001 291	0.004 334	0.004 231
RCP 9	.250	0.503	0.300 2	0.012 313	0.003 8	0.004 255	0.003 220	0.003 86	0.004 196	0.004 352	0.007 136
RCP10	.300	0.461	0.252 5	0.015 321	0.004 151	0.001 194	0.002 84	0.002 176	0.001 314	0.001 168	0.004 117
RCP11	.399	0.385	0.208 20	0.010 343	0.003 289	0.004 292	0.005 288	0.002 125	0.002 196	0.003 213	0.000 152
RCP12	.501	0.285	0.159 25	0.011 345	0.004 2	0.004 319	0.003 165	0.006 183	0.004 104	0.007 281	0.002 0
RCP13	.600	0.262	0.129 33	0.007 4	0.004 8	0.002 267	0.005 243	0.006 223	0.005 124	0.001 73	0.005 219
RCP14	.701	0.291	0.088 41	0.007 341	0.003 111	0.007 316	0.004 231	0.004 142	0.003 96	0.004 263	0.002 160
RCP15	.800	0.138	0.060 53	0.010 24	0.006 314	0.005 301	0.004 271	0.002 224	0.004 290	0.003 286	0.002 267
RCP16	.900	-0.083	0.022 77	0.007 35	0.012 71	0.003 309	0.004 199	0.001 205	0.005 142	0.001 302	0.001 91
RCP17	.969	-0.062	0.006 193	0.005 225	0.001 214	0.004 192	0.002 328	0.005 209	0.002 341	0.004 160	0.003 109

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	REL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	69.96	0.262	0.399	3.10	0.0	4.97	12111.9	20

V	Q	QW	CN(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
135.0 (443.0)	47328. (988.3)	9.648E 07	-0.026	0.851	8.04	-0.00070	0.788	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.975	3.103 9	0.134 311	0.071 214	0.008 161	0.024 127	0.023 65	0.006 17	0.004 287	0.003 293
CM		0.650	0.219 3	0.014 344	0.002 344	0.003 298	0.008 213	0.013 11	0.007 157	0.004 337	0.002 277
CN		-0.007	0.019 302	0.002 231	0.002 140	0.001 67	0.002 69	0.002 215	0.001 331	0.001 109	0.001 43
PCP 1	.010	2.350	1.614 341	0.123 256	0.054 142	0.007 321	0.013 63	0.004 327	0.018 237	0.012 134	0.004 111
PCP 2	.020	2.294	1.225 349	0.093 294	0.020 183	0.004 266	0.010 129	0.007 312	0.009 295	0.008 103	0.001 304
PCP 3	.030	2.147	1.016 349	0.041 305	0.016 297	0.001 293	0.007 102	0.009 330	0.008 246	0.001 259	0.004 161
PCP 4	.049	2.010	0.878 350	0.042 295	0.011 240	0.003 263	0.008 119	0.001 28	0.005 297	0.011 148	0.002 339
PCP 5	.074	1.778	0.702 351	0.026 309	0.010 258	0.003 238	0.006 126	0.003 42	0.006 302	0.008 129	0.002 268
PCP 6	.099	1.615	0.572 354	0.032 317	0.006 197	0.006 283	0.005 120	0.003 94	0.006 343	0.009 154	0.007 329
PCP 7	.149	1.184	0.441 356	0.021 337	0.007 260	0.006 278	0.005 185	0.004 42	0.002 11	0.103 193	0.010 191
PCP 8	.200	0.943	0.345 4	0.019 336	0.008 253	0.002 164	0.002 263	0.004 234	0.005 343	0.002 80	0.002 219
PCP 9	.250	0.892	0.288 3	0.022 335	0.006 284	0.002 227	0.010 232	0.006 41	0.002 345	0.006 344	0.005 338
PCP10	.300	0.734	0.236 5	0.016 337	0.003 259	0.005 248	0.002 318	0.002 251	0.004 329	0.004 249	0.001 281
PCP11	.399	0.676	0.139 350	0.009 24	0.017 64	0.011 3	0.006 192	0.018 352	0.001 140	0.029 290	0.023 314
PCP12	.501	0.459	0.154 31	0.013 14	0.006 292	0.001 59	0.007 227	0.007 39	0.003 129	0.003 322	0.004 111
PCP13	.600	0.376	0.141 49	0.007 292	0.017 18	0.013 177	0.024 310	0.028 105	0.021 274	0.018 70	0.021 234
PCP14	.701	0.370	0.083 49	0.009 353	0.007 355	0.010 279	0.001 328	0.013 109	0.008 79	0.025 16	0.010 147
PCP15	.800	0.187	0.060 68	0.007 49	0.006 198	0.005 210	0.002 314	0.014 83	0.038 352	0.006 338	0.003 329
PCP16	.900	-0.044	0.020 101	0.006 96	0.005 276	0.007 292	0.003 217	0.004 64	0.004 146	0.003 66	0.002 167
PCP17	.969	-0.068	0.015 151	0.007 326	0.002 153	0.002 77	0.007 267	0.005 303	0.002 290	0.006 351	0.001 344

PROCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	REL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	68.48	0.260	0.397	3.14	0.0	7.48	12111.4	20

V	Q	QW	CN(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
134.8 (439.8)	46846. (978.4)	0.619E 07	-0.021	1.103	10.69	-0.00004	1.994	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.483	3.137 0	0.102 315	0.170 188	0.013 151	0.020 64	0.015 56	0.012 140	0.003 230	0.007 291
CM		0.686	0.222 12	0.020 341	0.007 227	0.002 349	0.002 260	0.002 19	0.002 191	0.000 115	0.001 331
CN		0.001	0.024 293	0.003 185	0.001 11	0.001 128	0.001 [illegible]	0.000 248	0.001 315	0.000 317	0.000 28
PCP 1	.010	4.252	1.995 344	0.104 267	0.138 208	0.004 199	0.017 149	0.029 165	0.007 67	0.004 344	0.000 1
PCP 2	.020	3.578	1.349 342	0.218 270	0.192 166	0.149 63	0.045 327	0.029 26	0.004 301	0.011 217	0.009 189
PCP 3	.030	3.193	0.983 351	0.032 337	0.015 261	0.021 64	0.026 307	0.020 232	0.015 114	0.005 42	0.005 5
PCP 4	.049	2.882	0.799 353	0.051 15	0.021 287	0.009 170	0.006 68	0.023 210	0.008 152	0.012 350	0.009 242
PCP 5	.074	2.601	0.652 355	0.019 350	0.010 268	0.001 188	0.004 178	0.001 73	0.002 144	0.004 28	0.006 279
PCP 6	.099	2.199	0.542 358	0.036 347	0.009 225	0.002 33	0.003 316	0.006 356	0.009 40	0.002 25	0.000 47
PCP 7	.149	1.699	0.417 2	0.026 343	0.007 240	0.007 270	0.002 95	0.005 17	0.004 30	0.007 78	0.009 16
PCP 8	.200	1.329	0.340 11	0.020 337	0.005 185	0.003 169	0.005 194	0.001 144	0.000 208	0.00 174	0.002 91
PCP 9	.250	1.136	0.292 9	0.019 341	0.000 230	0.000 250	0.003 215	0.006 [illegible]	0.001 141	0.002 149	0.003 348
PCP10	.300	0.907	0.245 13	0.017 331	0.005 229	0.004 64	0.001 230	0.005 141	0.007 75	0.003 126	0.001 297
PCP11	.399	0.811	0.704 29	0.022 351	0.006 226	0.006 43	0.005 249	0.003 358	0.003 85	0.001 142	0.006 55
PCP12	.501	0.611	0.165 19	0.010 354	0.006 246	0.002 285	0.006 296	0.006 340	0.003 294	0.002 183	0.002 237
PCP13	.600	0.495	0.127 48	0.017 9	0.009 296	0.005 119	0.006 289	0.008 180	0.001 75	0.001 295	0.001
PCP14	.701	0.444	0.103 66	0.024 355	0.007 198	0.002 8	0.008 243	0.006 15	0.008 179	0.004 293	0.004 331
PCP15	.800	0.222	0.081 78	0.023 346	0.005 213	0.008 311	0.003 177	0.004 23	0.007 84	0.007 93	0.004 179
PCP16	.900	-0.054	0.049 78	0.005 372	0.005 119	0.002 308	0.002 251	0.006 118	0.011 162	0.004 309	0.004 247
PCP17	.969	-0.069	0.017 73	0.007 9	0.001 23	0.006 297	0.002 88	0.012 291	0.015 19	0.003 142	0.003 119

FORCED PITCHING OSCILLATION — AIRFOIL — MLP 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.91	0.202	0.394	3.07	0.0	9.96	12111.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TAB	EXT DAMP
133.2 (437.1)	46315. (967.3)	0.698 07	-0.019	1.319	12.66	-0.00093	1.894	0.0

HARMONIC ANALYSIS

DATA TYPE	R/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.998	3.072 0	0.194 332	0.078 174	0.027 120	0.009 100	0.017 79	0.003 117	0.006 96	0.010 301
CN		0.073	0.318 96	0.045 268	0.009 47	0.008 283	0.007 210	0.004 174	0.004 98	0.004 331	0.001 39
CM		0.006	0.025 248	0.010 11	0.006 216	0.002 213	0.002 62	0.001 290	0.001 344	0.001 114	0.000 222
RCP 1	.010	4.485	0.926 12	0.674 61	0.126 329	0.184 56	0.125 318	0.051 169	0.019 286	0.038 101	0.054 66
RCP 2	.020	4.178	1.093 24	0.356 10	0.139 332	0.152 321	0.092 305	0.111 289	0.075 296	0.050 247	0.030 213
RCP 3	.030	3.679	0.782 31	0.436 24	0.279 304	0.199 291	0.106 215	0.081 191	0.062 153	0.028 197	0.046 191
RCP 4	.040	3.345	0.809 27	0.260 345	0.104 239	0.026 282	0.075 227	0.048 160	0.033 143	0.045 110	0.036 53
RCP 5	.074	2.931	0.678 33	0.209 329	0.080 234	0.029 316	0.059 197	0.038 123	0.020 97	0.024 47	0.014 331
RCP 6	.060	2.475	0.623 33	0.199 322	0.095 198	0.049 279	0.080 171	0.092 78	0.025 95	0.044 14	0.025 272
RCP 7	.100	1.880	0.543 28	0.139 291	0.021 133	0.062 247	0.071 123	0.035 358	0.005 353	0.015 140	0.022 308
RCP 8	.200	1.595	0.483 31	0.124 277	0.033 115	0.032 230	0.043 104	0.021 317	0.014 124	0.014 334	0.014 324
RCP 9	.250	1.311	0.404 27	0.110 263	0.029 140	0.032 166	0.048 42	0.028 279	0.012 288	0.013 201	0.016 83
RCP10	.300	1.144	0.406 27	0.118 291	0.041 114	0.009 131	0.020 356	0.019 210	0.011 28	0.010 243	0.014 153
RCP11	.399	0.926	0.347 38	0.109 246	0.040 93	0.008 101	0.028 352	0.020 236	0.008 108	0.004 222	0.008 197
RCP12	.501	0.679	0.297 44	0.085 226	0.030 63	0.011 16	0.027 294	0.019 195	0.002 71	0.006 350	0.008 294
RCP13	.600	0.521	0.249 54	0.067 213	0.042 44	0.010 359	0.030 239	0.021 114	0.007 315	0.002 308	0.005 238
RCP14	.701	0.420	0.213 69	0.044 198	0.031 4	0.004 225	0.013 231	0.006 114	0.006 80	0.008 323	0.006 56
RCP15	.800	0.219	0.138 95	0.036 177	0.022 350	0.014 12	0.015 203	0.005 53	0.005 96	0.008 261	0.007 62
RCP16	.900	-0.020	0.064 25	0.041 143	0.014 316	0.007 285	0.017 154	0.006 6	0.008 74	0.003 4	0.001 279
RCP17	.969	-0.061	0.031 7	0.022 178	0.006 331	0.009 322	0.004 137	0.004 225	0.008 141	0.007 328	0.008 11

FORCED PITCHING OSCILLATION — AIRFOIL — MLP 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	68.69	0.251	0.407	3.04	0.0	9.88	12119.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TAB	EXT DAMP
138.8 (455.4)	49092. (1025.3)	0.648 07	-0.921	1.289	12.61	-0.00079	0.918	0.0

HARMONIC ANALYSIS

DATA TYPE	R/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.877	3.074 0	0.195 332	0.078 184	0.011 129	0.009 134	0.019 96	0.006 74	0.011 95	0.002 2
CN		0.069	0.300 37	0.051 277	0.011 70	0.009 298	0.007 218	0.002 143	0.003 138	0.005 28	0.001 281
CM		0.002	0.022 248	0.010 15	0.008 225	0.001 217	0.002 89	0.001 264	0.002 998	0.001 158	0.002 20
RCP 1	.010	4.841	0.794 16	0.693 60	0.112 339	0.208 64	0.123 333	0.038 165	0.019 307	0.060 187	0.047 70
RCP 2	.020	3.998	0.906 26	0.350 15	0.132 341	0.191 329	0.101 315	0.124 296	0.077 253	0.027 269	0.020 244
RCP 3	.030	3.996	0.717 33	0.422 29	0.282 319	0.194 259	0.119 210	0.069 185	0.053 178	0.022 129	0.023 158
RCP 4	.040	3.196	0.755 31	0.286 348	0.131 741	0.010 244	0.076 237	0.056 164	0.023 169	0.038 138	0.046 44
RCP 5	.074	2.795	0.614 33	0.227 337	0.085 215	0.029 334	0.078 220	0.059 171	0.025 105	0.040 71	0.043 8
RCP 6	.090	2.485	0.600 34	0.217 325	0.097 208	0.049 281	0.090 183	0.051 88	0.014 134	0.033 45	0.048 329
RCP 7	.140	1.841	0.552 28	0.192 295	0.046 140	0.044 216	0.084 119	0.053 12	0.010 4	0.031 321	0.025 298
RCP 8	.200	1.589	0.483 31	0.140 290	0.033 186	0.044 235	0.050 111	0.026 339	0.016 110	0.029 19	0.021 287
RCP 9	.250	1.300	0.438 27	0.128 268	0.041 128	0.020 159	0.035 53	0.022 315	0.017 277	0.014 195	0.011 92
RCP10	.300	1.119	0.381 27	0.125 295	0.048 117	0.019 84	0.051 358	0.023 215	0.013 55	0.004 108	0.007 101
RCP11	.399	0.907	0.327 38	0.116 294	0.048 106	0.028 68	0.023 347	0.013 223	0.007 3	0.016 218	0.015 79
RCP12	.501	0.677	0.279 42	0.085 223	0.047 60	0.014 344	0.022 292	0.017 187	0.007 99	0.012 79	0.010 314
RCP13	.600	0.511	0.235 53	0.066 216	0.038 45	0.006 192	0.017 266	0.008 147	0.006 121	0.015 27	0.012 231
RCP14	.701	0.425	0.193 68	0.044 208	0.041 19	0.014 215	0.013 259	0.009 74	0.013 282	0.014 336	0.009 184
RCP15	.800	0.235	0.134 99	0.040 189	0.031 19	0.010 18	0.019 214	0.009 49	0.006 129	0.014 308	0.008 194
RCP16	.900	-0.022	0.062 74	0.046 161	0.014 7	0.014 322	0.017 180	0.006 109	0.007 303	0.009 148	0.003 280
RCP17	.969	-0.048	0.021 354	0.019 176	0.004 7	0.004 342	0.001 124	0.002 18	0.007 161	0.002 343	0.004 284

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.90	0.256	0.402	2.94	0.0	12.99	12113.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
136.2 (447.0)	48038. (1003.3)	0.648 07	-0.152	1.912	19.59	0.00071	-0.236	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.997	2.942 0	0.292 352	0.116 163	0.033 137	0.010 17	0.018 43	0.005 115	0.008 189	0.009 130
CN		1.041	0.406 48	0.083 315	0.049 192	0.020 76	0.003 307	0.005 41	0.001 281	0.003 141	0.007 78
CM		-0.021	0.062 181	0.033 91	0.022 341	0.009 253	0.005 146	0.002 148	0.002 0	0.002 243	0.002 175
PCP 1	.010	4.842	0.793 132	0.602 76	0.161 247	0.167 183	0.040 239	0.091 201	0.041 128	0.022 184	0.037 130
PCP 2	.020	4.016	0.973 89	0.587 56	0.066 43	0.172 184	0.154 147	0.069 181	0.083 202	0.037 197	0.023 265
PCP 3	.030	3.366	0.967 115	0.700 65	0.158 43	0.181 84	0.137 49	0.033 85	0.078 99	0.039 101	0.046 124
PCP 4	.049	3.163	0.898 90	0.678 28	0.037 337	0.080 44	0.022 8	0.049 75	0.037 11	0.026 189	0.053 125
PCP 5	.074	2.679	0.822 84	0.587 12	0.025 291	0.096 355	0.019 194	0.055 42	0.046 343	0.007 58	0.030 49
PCP 6	.099	2.424	0.803 76	0.335 2	0.026 3	0.069 334	0.012 223	0.061 28	0.095 319	0.015 149	0.043 65
PCP 7	.149	1.924	0.757 59	0.242 338	0.037 318	0.048 279	0.011 45	0.027 331	0.018 344	0.025 329	0.019 328
PCP 8	.200	1.610	0.683 46	0.215 336	0.044 313	0.060 252	0.008 284	0.028 291	0.032 254	0.006 244	0.015 267
PCP 9	.250	1.389	0.632 46	0.180 311	0.059 271	0.045 218	0.020 214	0.019 198	0.010 171	0.008 176	0.020 177
PCP10	.300	1.242	0.579 38	0.150 300	0.066 247	0.022 160	0.035 235	0.024 192	0.019 81	0.011 265	0.025 126
PCP11	.399	1.049	0.555 40	0.167 298	0.126 236	0.050 141	0.017 249	0.031 144	0.021 73	0.004 297	0.013 109
PCP12	.501	0.791	0.468 34	0.140 281	0.129 208	0.056 108	0.015 146	0.032 76	0.028 355	0.016 239	0.011 118
PCP13	.600	0.632	0.373 32	0.117 271	0.133 183	0.062 73	0.016 92	0.026 27	0.027 294	0.022 173	0.019 67
PCP14	.701	0.514	0.287 23	0.121 220	0.111 151	0.057 40	0.015 359	0.021 336	0.010 315	0.011 117	0.023 1
PCP15	.800	0.328	0.234 5	0.110 209	0.093 137	0.037 40	0.020 355	0.023 307	0.029 169	0.018 53	0.017 392
PCP16	.900	0.046	0.152 350	0.075 227	0.077 120	0.038 8	0.017 322	0.013 236	0.019 116	0.020 358	0.011 228
PCP17	.969	-0.009	0.060 346	0.034 256	0.048 149	0.025 17	0.012 299	0.013 318	0.009 188	0.008 29	0.008 12

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.69	0.259	0.397	2.91	0.0	14.84	12113.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
134.4 (441.0)	46985. (981.3)	0.638 07	-0.199	1.639	17.09	-0.00049	0.568	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.940	2.909 0	0.163 56	0.142 197	0.019 162	0.015 72	0.011 15	0.018 180	0.010 149	0.001 344
CN		1.084	0.409 47	0.116 0	0.037 266	0.017 252	0.015 191	0.011 24	0.004 277	0.003 268	0.004 333
CM		-0.040	0.091 188	0.040 126	0.018 47	0.007 30	0.008 344	0.005 324	0.002 315	0.000 49	0.001 144
PCP 1	.010	4.742	1.122 148	0.268 86	0.089 321	0.106 327	0.060 22	0.057 17	0.037 47	0.029 34	0.015 99
PCP 2	.020	3.974	1.287 136	0.362 100	0.112 310	0.156 287	0.055 38	0.061 32	0.051 92	0.018 86	0.013 146
PCP 3	.030	3.738	1.315 148	0.468 106	0.252 191	0.157 181	0.075 265	0.051 264	0.039 1	0.029 0	0.019 59
PCP 4	.049	3.113	1.044 118	0.290 70	0.132 126	0.026 193	0.026 220	0.047 290	0.026 331	0.052 5	0.027 345
PCP 5	.074	2.669	0.920 105	0.181 45	0.121 103	0.014 243	0.019 142	0.023 299	0.026 296	0.029 308	0.012 292
PCP 6	.099	2.408	0.859 97	0.166 57	0.122 79	0.017 191	0.021 92	0.050 268	0.026 239	0.023 291	0.011 320
PCP 7	.149	1.959	0.735 73	0.126 45	0.087 25	0.019 258	0.024 197	0.025 194	0.007 274	0.028 967	0.010 265
PCP 8	.200	1.679	0.685 67	0.156 47	0.086 15	0.035 17	0.006 96	0.017 32	0.013 349	0.006 311	0.011 327
PCP 9	.250	1.463	0.628 57	0.173 30	0.090 334	0.030 1	0.025 24	0.026 329	0.010 313	0.008 278	0.017 227
PCP10	.300	1.290	0.612 51	0.198 19	0.070 309	0.037 37	0.034 7	0.031 3	0.024 323	0.011 233	0.017 96
PCP11	.399	1.104	0.573 47	0.224 15	0.102 304	0.055 333	0.056 280	0.018 159	0.029 246	0.030 198	0.020 66
PCP12	.501	0.876	0.518 37	0.218 352	0.139 272	0.056 290	0.056 236	0.027 101	0.026 261	0.027 124	0.012 358
PCP13	.600	0.697	0.469 29	0.192 336	0.107 249	0.052 246	0.065 213	0.024 85	0.014 201	0.029 79	0.007 224
PCP14	.701	0.564	0.390 18	0.174 302	0.084 220	0.044 207	0.055 159	0.025 44	0.025 134	0.021 19	0.009 317
PCP15	.800	0.404	0.328 8	0.160 290	0.073 210	0.054 185	0.051 125	0.032 13	0.019 80	0.018 307	0.006 309
PCP16	.900	0.174	0.189 10	0.110 286	0.054 202	0.030 163	0.043 118	0.023 3	0.009 63	0.021 238	0.003 365
PCP17	.969	0.016	0.072 28	0.058 298	0.029 221	0.023 194	0.012 156	0.012 28	0.015 61	0.007 300	0.009 277

FORCED PITCHING OSCILLATION — AIRFOIL MLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.41	0.261	0.395	2.95	0.0	17.46	12113.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.0 (438.4)	46497. (971.1)	0.63E 07	-0.201	1.485	18.85	-0.00233	2.610	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.456	2.953 0	0.010 200	0.070 220	0.014 104	0.026 33	0.011 113	0.009 188	0.008 161	0.004 340
CN		1.044	0.356 70	0.052 24	0.019 93	0.017 299	0.006 351	0.005 247	0.000 324	0.007 113	0.001 190
CM		-0.077	0.086 216	0.026 167	0.010 174	0.006 96	0.003 168	0.002 49	0.001 193	0.002 318	0.001 85
DCP 1	.010	3.917	1.516 180	0.044 341	0.132 34	0.091 67	0.056 146	0.0 [illegible] 173	0.010 131	0.003 254	0.013 165
DCP 2	.020	3.307	1.128 [illegible]	0.128 129	0.086 335	0.090 69	0.046 104	0.018 135	0.028 158	0.015 32	0.007 116
DCP 3	.030	2.903	1.102 154	0.052 204	0.170 214	0.080 2	0.002 316	0.029 131	0.019 226	0.014 184	0.005 106
DCP 4	.049	2.497	0.803 141	0.165 180	0.089 117	0.092 7	0.068 313	0.052 273	0.061 208	0.047 120	0.040 73
DCP 5	.074	2.163	0.585 112	0.119 197	0.040 91	0.018 208	0.020 87	0.008 17	0.012 192	0.009 192	0.022 292
DCP 6	.099	1.982	0.554 95	0.148 169	0.021 84	0.018 272	0.017 339	0.024 58	0.030 95	0.019 129	0.007 181
DCP 7	.149	1.690	0.492 72	0.111 140	0.018 229	0.074 269	0.037 282	0.022 288	0.013 78	0.017 62	0.012 76
DCP 8	.200	1.498	0.495 75	0.104 118	0.325 139	0.029 264	0.003 85	0.017 157	0.009 59	0.010 114	0.015 199
DCP 9	.250	1.368	0.454 71	0.118 80	0.041 128	0.020 187	0.023 173	0.007 214	0.025 155	0.010 315	0.008 81
DCP10	.300	1.264	0.454 63	0.127 44	0.024 96	0.009 74	0.011 168	0.005 67	0.004 311	0.005 341	0.004 325
DCP11	.399	1.134	0.448 65	0.129 41	0.042 85	0.022 34	0.006 80	0.007 0	0.021 276	0.018 55	0.014 314
DCP12	.501	0.951	0.472 57	0.140 23	0.030 60	0.032 355	0.018 59	0.017 308	0.024 210	0.024 314	0.008 160
DCP13	.600	0.793	0.424 51	0.129 354	0.038 35	0.036 304	0.017 18	0.015 253	0.023 354	0.009 155	0.007 231
DCP14	.701	0.617	0.395 42	0.117 337	0.056 338	0.042 277	0.014 5	0.018 212	0.016 45	0.012 149	0.012 199
DCP15	.800	0.516	0.328 38	0.101 328	0.058 311	0.031 260	0.020 369	0.011 222	0.009 313	0.021 194	0.004 77
DCP16	.900	0.218	0.219 43	0.061 325	0.035 347	0.029 240	0.024 267	0.006 153	0.018 74	0.008 87	0.008 358
DCP17	.969	0.054	0.104 60	0.026 327	0.025 348	0.009 4	0.009 21	0.008 220	0.007 160	0.010 132	0.009 271

FORCED PITCHING OSCILLATION — AIRFOIL [illegible] 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.069	0.505	2.60	0.0	0.01	12119.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
169.2 (555.1)	74066. (1546.9)	0.79E 07	-0.020	0.363	2.70	-0.00057	0.769	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.010	2.599 0	0.064 10	0.053 219	0.023 124	0.026 49	0.012 93	0.015 190	0.013 121	0.012 2
CN		0.127	0.245 353	0.011 34	0.004 119	0.003 230	0.001 306	0.001 62	0.002 165	0.001 158	0.001 8
CM		-0.015	0.004 276	0.001 32	0.001 124	0.001 215	0.001 323	0.000 39	0.000 131	0.001 309	0.000 330
DCP 1	.010	-0.698	1.562 348	0.147 52	0.069 142	0.040 233	0.017 317	0.007 46	0.007 115	0.015 298	0.012 350
DCP 2	.020	-0.398	1.152 350	0.076 30	0.040 124	0.026 219	0.020 309	0.013 42	0.018 129	0.012 275	0.013 330
DCP 3	.030	-0.108	0.974 350	0.061 21	0.033 130	0.024 237	0.020 332	0.013 86	0.013 447	0.014 299	0.013 2
DCP 4	.049	0.168	0.801 350	0.046 15	0.028 117	0.020 208	0.015 307	0.010 74	0.011 133	0.009 273	0.011 321
DCP 5	.074	0.321	0.671 350	0.041 33	0.022 122	0.017 232	0.014 333	0.010 91	0.007 153	0.010 309	0.008 25
DCP 6	.099	0.385	0.567 351	0.036 35	0.018 125	0.015 224	0.010 329	0.010 84	0.008 155	0.009 308	0.007 32
DCP 7	.149	0.270	0.409 351	0.031 40	0.014 81	0.015 219	0.008 314	0.007 52	0.007 149	0.006 257	0.004 330
DCP 8	.200	0.214	0.342 353	0.020 46	0.012 119	0.007 216	0.007 304	0.007 5	0.007 168	0.004 259	0.004 305
DCP 9	.250	0.206	0.350 352	0.007 357	0.002 85	0.000 356	0.001 240	0.001 42	0.002 237	0.003 116	0.002 115
DCP10	.300	0.207	0.296 352	0.006 [illegible]	0.003 305	0.003 219	0.001 141	0.001 312	0.001 174	0.004 118	0.002 113
DCP11	.399	0.173	0.238 356	0.005 [illegible]	0.004 311	0.002 207	0.002 187	0.002 297	0.001 219	0.003 113	0.000 159
DCP12	.501	0.127	0.181 358	0.003 28	0.001 305	0.003 314	0.001 224	0.001 353	0.000 339	0.003 119	0.002 346
DCP13	.600	0.135	0.136 0	0.004 49	0.002 197	0.002 346	0.002 176	0.002 150	0.002 355	0.005 138	0.001 54
DCP14	.701	0.212	0.097 0	0.003 38	0.001 258	0.001 15	0.001 194	0.001 179	0.003 286	0.004 151	0.003 284
DCP15	.800	0.087	0.054 4	0.004 45	0.001 225	0.003 18	0.002 97	0.002 172	0.002 272	0.003 141	0.001 169
DCP16	.900	-0.103	0.011 7	0.001 133	0.004 359	0.001 62	0.003 153	0.001 293	0.001 168	0.004 111	0.003 123
DCP17	.969	-0.051	0.011 176	0.002 257	0.001 343	0.002 151	0.003 137	0.001 44	0.002 77	0.005 144	0.001 99

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TIMER HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.00	0.079	0.502	2.61	0.0	2.48	12115.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	ADPP RMVP	TPP	PET RMVP
167.4 (549.1)	72859 (1521.7)	0.790 07	-0.318	0.682	9.14	-0.00049	0.020	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		2.477	2.614 0	0.050 2	0.042 200	0.021 120	0.023 31	0.004 44	0.013 188	0.010 96	0.008 34
CN		0.404	0.274 353	0.005 336	0.000 168	0.001 218	0.001 313	0.001 65	0.001 165	0.004 51	0.002 129
CM		-0.010	0.007 317	0.000 249	0.000 296	0.000 202	0.001 174	0.000 49	0.001 338	0.001 210	0.000 329
DCP 1	.010	1.042	1.692 349	0.037 331	0.014 205	0.008 218	0.007 0	0.005 341	0.010 124	0.007 42	0.002 49
DCP 2	.020	0.975	1.486 350	0.029 330	0.002 162	0.002 267	0.002 11	0.002 76	0.002 110	0.007 70	0.006 102
DCP 3	.030	1.000	1.217 350	0.023 307	0.002 146	0.001 270	0.001 71	0.004 49	0.001 200	0.006 80	0.005 89
DCP 4	.040	1.189	1.038 350	0.025 289	0.002 242	0.001 64	0.001 289	0.002 96	0.002 170	0.005 69	0.003 107
DCP 5	.074	1.146	0.826 350	0.018 296	0.003 286	0.002 35	0.001 179	0.001 69	0.002 127	0.004 73	0.003 117
DCP 6	.099	1.079	0.698 350	0.012 342	0.010 327	0.011 227	0.000 117	0.007 31	0.004 250	0.004 86	0.002 102
DCP 7	.149	0.787	0.505 351	0.011 289	0.002 150	0.008 208	0.001 147	0.006 194	0.002 219	0.007 108	0.003 193
DCP 8	.200	0.626	0.412 354	0.006 345	0.001 258	0.001 81	0.003 351	0.001 310	0.002 49	0.004 88	0.002 108
DCP 9	.250	0.561	0.351 352	0.005 22	0.001 89	0.003 289	0.001 250	0.001 109	0.001 259	0.004 21	0.002 79
DCP10	.300	0.512	0.293 353	0.007 9	0.000 255	0.002 179	0.002 312	0.002 13	0.001 257	0.003 15	0.003 115
DCP11	.349	0.416	0.234 357	0.005 17	0.002 162	0.001 244	0.003 323	0.001 108	0.002 130	0.004 38	0.003 149
DCP12	.501	0.313	0.180 359	0.004 12	0.002 162	0.001 244	0.003 336	0.001 77	0.002 169	0.004 52	0.003 152
DCP13	.600	0.278	0.158 1	0.002 35	0.001 10	0.002 182	0.002 217	0.001 59	0.001 121	0.004 22	0.002 57
DCP14	.701	0.319	0.189 1	0.002 15	0.003 77	0.001 148	0.001 269	0.001 170	0.003 183	0.003 89	0.001 143
DCP15	.800	0.164	0.094 5	0.002 337	0.001 50	0.001 359	0.003 298	0.002 71	0.002 129	0.005 53	0.001 82
DCP16	.900	-0.089	0.014 355	0.001 123	0.001 276	0.002 339	0.004 343	0.002 271	0.002 214	0.002 11	0.006 179
DCP17	.949	-0.065	0.010 149	0.003 289	0.004 188	0.001 143	0.001 293	0.000 350	0.001 55	0.007 47	0.001 53

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TIMER HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.070	0.497	2.69	0.0	4.98	12115.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	ADPP RMVP	TPP	PET RMVP
166.5 (546.2)	72294. (1589.9)	0.788 07	-0.019	0.955	7.65	-0.00090	1.197	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		4.978	2.627 3	0.065 9	0.053 218	0.028 115	0.026 41	0.013 15	0.020 188	0.012 77	0.010 23
CN		0.687	0.267 354	0.008 14	0.002 117	0.001 4	0.001 174	0.001 37	0.001 76	0.003 50	0.001 344
CM		-0.003	0.010 325	0.002 239	0.001 180	0.000 152	0.000 125	0.000 137	0.002 298	0.001 294	0.000 283
DCP 1	.010	2.908	1.962 348	0.106 351	0.036 40	0.043 235	0.055 128	0.009 5	0.013 43	0.027 348	0.009 226
DCP 2	.020	2.579	1.680 350	0.228 350	0.139 150	0.029 31	0.044 154	0.060 49	0.025 296	0.024 17	0.040 267
DCP 3	.030	2.493	1.509 350	0.182 258	0.179 151	0.130 51	0.050 308	0.029 35	0.067 290	0.067 186	0.047 81
DCP 4	.049	2.251	0.982 350	0.084 42	0.069 325	0.031 217	0.058 328	0.032 211	0.049 105	0.043 9	0.049 258
DCP 5	.074	2.006	0.813 350	0.033 36	0.019 333	0.015 228	0.010 140	0.007 33	0.004 281	0.032 123	0.006 48
DCP 6	.099	1.788	0.660 351	0.030 35	0.002 53	0.005 215	0.005 131	0.002 144	0.004 58	0.002 106	0.005 65
DCP 7	.149	1.296	0.490 352	0.026 40	0.004 102	0.004 229	0.002 241	0.002 38	0.001 70	0.001 46	0.002 38
DCP 8	.200	1.046	0.386 355	0.013 31	0.002 153	0.001 346	0.002 235	0.001 191	0.001 344	0.003 58	0.003 60
DCP 9	.250	0.917	0.329 353	0.013 29	0 327	0.002 16	0.002 64	0.001 32	0.002 111	0.729 70	0.002 107
DCP10	.300	0.830	0.272 354	0.013 32	4 74	0.001 271	0.002 43	0.001 95	0.001 318	0.001 32	0.002 111
DCP11	.349	0.652	0.217 359	0.011 28	0.002 64	0.002 4	0.001 192	0.003 17	0.003 22	0.004 62	0.001 33
DCP12	.501	0.493	0.167 0	0.010 43	0.003 21	0.002 267	0.002 240	0.000 237	0.001 244	0.002 68	0.001 345
DCP13	.600	0.412	0.124 2	0.009 43	0.003 14	0.002 348	0.001 138	0.001 159	0.001 135	0.004 34	0.001 304
DCP14	.701	0.402	0.079 9	0.008 43	0.001 344	0.001 347	0.002 33	0.002 289	0.001 111	0.003 93	0.001 358
DCP15	.800	0.190	0.043 14	0.007 42	0.002 44	0.001 6	0.003 285	0.001 79	0.001 117	0.003 64	0.000 349
DCP16	.900	-0.072	0.015 20	0.006 22	0.002 119	0.002 38	0.003 128	0.001 47	0.001 85	0.003 63	0.001 62
DCP17	.949	-0.079	0.007 177	0.001 246	0.001 341	0.001 301	0.002 295	0.002 323	0.002 84	0.004 75	0.002 314

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.N	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.071	0.494	2.63	0.0	7.46	12115.4	20

V	Q	RN	CMMIN)	CMMAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
165.4 (542.5)	71586. (1495.1)	0.786 07	-0.007	1.183	10.09	-0.00128	1.698	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.453	2.635 0	0.069 26	0.057 220	0.020 158	0.025 33	0.004 108	0.006 125	0.017 137	0.006 340
CN		0.027	0.200 6	0.042 9	0.017 225	0.009 87	0.003 349	0.004 33	0.004 303	0.005 166	0.000 130
CM		0.012	0.019 332	0.001 345	0.004 335	0.003 221	0.001 107	0.000 342	0.000 166	0.001 330	0.000 318
DCP 1	.010	4.449	1.130 349	0.508 59	0.107 311	0.011 140	0.075 108	0.004 0	0.027 110	0.012 55	0.003 336
DCP 2	.020	4.041	1.430 353	0.391 60	0.234 327	0.052 70	0.006 287	0.003 31	0.015 147	0.015 22	0.006 77
DCP 3	.030	3.847	1.462 354	0.141 44	0.228 331	0.023 65	0.109 313	0.006 39	0.009 286	0.007 15	0.021 252
DCP 4	.049	3.587	1.251 356	0.106 21	0.189 342	0.131 244	0.038 357	0.050 223	0.008 325	0.003 208	0.017 336
DCP 5	.074	2.736	0.643 8	0.202 351	0.062 232	0.071 279	0.078 186	0.007 248	0.004 179	0.006 107	0.006 93
DCP 6	.099	2.308	0.419 8	0.170 9	0.116 235	0.073 163	0.051 122	0.006 63	0.007 10	0.015 312	0.008 287
DCP 7	.149	1.712	0.324 3	0.076 20	0.037 235	0.026 151	0.022 101	0.003 46	0.018 345	0.014 285	0.012 224
DCP 8	.200	1.435	0.381 4	0.080 308	0.074 194	0.043 105	0.023 42	0.017 355	0.015 286	0.011 184	0.002 161
DCP 9	.250	1.265	0.357 0	0.083 278	0.082 166	0.049 69	0.020 335	0.014 329	0.016 271	0.017 179	0.012 115
DCP10	.300	1.079	0.259 3	0.091 296	0.093 170	0.086 66	0.019 338	0.006 296	0.009 254	0.013 152	0.006 85
DCP11	.399	0.843	0.172 11	0.026 344	0.025 175	0.025 59	0.017 313	0.007 192	0.002 66	0.006 177	0.007 128
DCP12	.501	0.621	0.102 23	0.035 32	0.008 217	0.010 44	0.008 277	0.005 173	0.004 359	0.005 191	0.003 101
DCP13	.600	0.491	0.064 45	0.038 34	0.010 246	0.005 39	0.003 269	0.003 71	0.005 332	0.005 166	0.003 127
DCP14	.701	0.425	0.053 109	0.045 44	0.012 264	0.006 86	0.003 297	0.002 345	0.001 0	0.005 158	0.001 196
DCP15	.800	0.198	0.048 112	0.025 36	0.008 214	0.006 66	0.001 319	0.004 64	0.001 302	0.004 141	0.001 218
DCP16	.900	-0.061	0.019 41	0.016 269	0.014 137	0.010 5	0.004 177	0.003 56	0.003 339	0.004 143	0.003 156
DCP17	.969	-0.074	0.010 11	0.014 258	0.011 153	0.003 50	0.001 357	0.002 59	0.003 255	0.006 113	0.002 37

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.N	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.069	0.505	2.59	0.0	8.02	12117.1	20

V	Q	RN	CMMIN)	CMMAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
169.4 (555.8)	74080 (1547.2)	0.798 07	-0.024	1.209	10.46	-0.00142	1.818	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		8.024	2.532 0	0.096 44	0.050 208	0.036 172	0.039 58	0.041 14	0.039 193	0.010 141	0.009 14
CN		0.991	0.005 84	0.058 64	0.025 67	0.021 22	0.010 356	0.008 319	0.004 207	0.004 328	0.001 280
CM		0.006	0.020 219	0.015 94	0.003 141	0.005 198	0.001 99	0.001 59	0.001 6	0.001 242	0.001 329
DCP 1	.010	4.425	1.400 175	0.337 90	0.079 120	0.072 103	0.058 45	0.014 29	0.014 19	0.011 189	0.015 122
DCP 2	.020	4.491	0.440 183	0.496 99	0.099 97	0.099 103	0.091 46	0.038 6	0.022 22	0.019 298	0.005 322
DCP 3	.030	4.392	0.347 190	0.543 101	0.149 78	0.084 96	0.108 30	0.049 353	0.036 349	0.045 289	0.023 293
DCP 4	.049	3.638	0.651 177	0.495 90	0.296 164	0.126 109	0.017 171	0.096 86	0.058 193	0.038 194	0.017 9
DCP 5	.074	2.691	0.376 128	0.472 84	0.179 133	0.148 98	0.147 171	0.004 246	0.042 274	0.048 294	0.061 340
DCP 6	.099	2.260	0.245 116	0.294 70	0.120 57	0.139 84	0.041 61	0.039 96	0.042 159	0.017 167	0.039 189
DCP 7	.149	1.832	0.178 78	0.138 51	0.071 26	0.049 158	0.079 349	0.026 331	0.011 261	0.007 289	0.026 245
DCP 8	.200	1.537	0.190 63	0.138 55	0.075 39	0.079 31	0.054 8	0.047 4	0.016 349	0.029 21	0.021 356
DCP 9	.250	1.379	0.220 52	0.126 37	0.073 20	0.066 2	0.055 347	0.045 333	0.029 326	0.028 340	0.033 301
DCP10	.300	1.176	0.197 48	0.083 23	0.050 26	0.057 355	0.045 331	0.032 301	0.013 267	0.018 314	0.019 265
DCP11	.399	0.940	0.148 50	0.041 349	0.023 43	0.033 344	0.023 313	0.014 267	0.007 184	0.003 301	0.005 213
DCP12	.501	0.694	0.109 60	0.026 329	0.017 74	0.028 126	0.013 276	0.008 237	0.008 197	0.006 294	0.009 192
DCP13	.600	0.550	0.079 82	0.020 293	0.011 110	0.017 290	0.013 203	0.007 203	0.012 153	0.003 119	0.004 189
DCP14	.701	0.423	0.070 114	0.025 264	0.009 135	0.009 276	0.009 120	0.001 254	0.009 195	0.008 114	0.006 60
DCP15	.800	0.226	0.054 97	0.013 270	0.003 315	0.010 284	0.009 105	0.002 215	0.006 146	0.007 81	0.001 252
DCP16	.900	-0.019	0.025 11	0.023 252	0.013 345	0.005 309	0.003 284	0.005 291	0.003 279	0.004 143	0.006 116
DCP17	.969	-0.049	0.046 6	0.009 293	0.009 313	0.002 319	0.007 353	0.001 251	0.005 259	0.001 156	0.002 289

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL NO	NATIVE NO	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	22.91	0.070	0.500	2.46	0.0	12.45	[illegible]	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAB	EXT DAMP
167.6 (549.8)	72912. (1522.8)	0.78E 07	-0.052	1.172	11.02	-0.00141	2.559	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.[illegible]	2.465 0	0.047 17	[illegible] 218	0.010 129	0.013 [illegible]17	0.000 [illegible]	0.010 175	0.011 98	0.008 68
CN		1.014	0.108 117	0.028 219	[illegible] 160	0.011 233	0.003 252	0.310 281	0.005 204	0.003 98	0.003 92
CM		-0.013	[illegible]42 196	0.003 274	[illegible]4 263	0.001 320	0.001 301	0.003 38	0.001 [illegible]	[illegible]01 239	0.000 8
DCP 1	.010	4.295	[illegible]471 178	0.043 255	0.061 239	0.011 335	0.009 310	0.018 322	0.043 [illegible]	0.004 74	0.015 236
DCP 2	.020	4.079	[illegible]410 178	0.138 279	0.134 271	0.016 271	0.024 283	0.025 17	0.047 256	0.031 97	0.005 308
DCP 3	.030	3.993	1.057 181	0.185 274	0.215 [illegible]	0.057 291	0.062 265	0.070 335	0.059 265	0.025 7	0.020 293
DCP 4	.049	3.291	0.913 175	0.357 271	0.190 7	0.029 289	0.057 2	0.032 77	0.063 [illegible]	0.028 [illegible]	0.018 171
DCP 5	.074	2.519	0.630 163	0.193 248	0.025 [illegible]	0.037 295	0.026 12	0.030 8	0.017 160	0.022 181	0.035 264
DCP 6	.099	2.230	0.375 152	0.080 224	0.043 143	0.034 279	0.005 26	0.021 [illegible]	0.012 244	0.010 164	0.026 78
DCP 7	.149	1.837	0.213 133	0.[illegible] 198	0.050 129	0.039 [illegible]	0.013 191	0.016 274	0.016 [illegible]	0.004 43	0.004 84
DCP 8	.200	1.622	0.269 136	0.066 207	0.035 205	0.026 [illegible]61	0.006 68	0.028 [illegible]	0.018 [illegible]	0.012 [illegible]	0.014 67
DCP 9	.250	1.494	0.218 122	0.[illegible] 162	0.070 [illegible]	0.028 [illegible]	0.015 254	0.023 344	0.007 145	0.[illegible] [illegible]	0.010 [illegible]
DCP10	.300	1.279	0.162 134	0.054 155	0.049 [illegible]	0.038 196	0.018 [illegible]	0.025 333	0.012 [illegible]	0.013 93	0.006 100
DCP11	.399	1.024	0.141 70	0.036 148	0.039 160	0.020 184	0.025 [illegible]	0.026 [illegible]	0.015 153	0.011 41	0.001 [illegible]
DCP12	.501	0.[illegible]	0.136 52	0.015 [illegible]	0.023 126	0.015 172	0.009 166	0.017 [illegible]	0.[illegible] 42	0.[illegible] [illegible]	0.010 [illegible]
DCP13	.600	0.471	0.178 39	0.020 234	0.022 [illegible]	0.001 6	0.009 [illegible]	0.011 232	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]
DCP14	.701	0.440	0.114 33	0.022 [illegible]	0.011 57	0.[illegible] [illegible]	0.005 124	0.[illegible] [illegible]	0.[illegible] 97	0.[illegible] 50	0.[illegible] [illegible]
DCP15	.800	0.275	0.125 [illegible]	0.012 76	0.[illegible] 40	0.[illegible] [illegible]	0.[illegible] 67	0.[illegible] [illegible]	0.[illegible] [illegible]	0.002 [illegible]	0.[illegible] [illegible]
DCP16	.900	0.[illegible]	0.[illegible] 13	0.[illegible] [illegible]	0.012 [illegible]	0.[illegible] [illegible]	0.[illegible] 62	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]
DCP17	.969	-0.[illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 73	0.[illegible] [illegible]

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL NO	NATIVE NO	K	MACH NO	REL.ALPHA	REL.H	ALPHA.0	TEST POINT	CYCLES ANALYZED
0.0	22.91	0.070	0.498	2.49	0.0	14.90	12117.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAB	EXT DAMP
166.7 (546.9)	72443. (1513.0)	0.78E 07	-0.076	1.078	14.50	-0.00194	2.589	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.895	2.490 0	0.064 17	0.021 217	0.033 197	0.007 106	0.009 162	0.028 23	0.021 191	0.004 127
CN		0.992	0.073 85	0.009 168	0.004 147	0.013 326	0.000 93	0.001 304	0.001 229	0.008 198	0.003 [illegible]
CM		-0.044	0.033 201	0.003 272	0.002 355	0.003 103	0.002 222	0.001 91	0.001 73	0.002 324	0.001 18
DCP 1	.010	3.518	0.427 160	0.014 302	0.042 70	0.015 93	0.012 46	0.016 302	0.003 [illegible]	0.006 [illegible]	0.020 [illegible]
DCP 2	.020	3.394	0.410 156	0.062 [illegible]	0.075 68	0.023 144	0.019 343	0.017 55	0.010 23	0.007 78	0.020 288
DCP 3	.030	3.216	0.554 172	0.114 264	0.065 41	0.059 106	0.017 276	0.028 94	0.027 29	0.006 16	0.010 183
DCP 4	.049	2.670	0.388 168	0.050 212	0.016 16	0.044 133	0.008 128	0.007 [illegible]	0.022 [illegible]	0.[illegible] [illegible]	0.010 91
DCP 5	.074	2.184	0.195 160	0.[illegible] 204	0.014 [illegible]	0.017 127	0.012 202	0.005 265	0.013 257	0.008 [illegible]	0.010 64
DCP 6	.099	2.013	0.148 161	0.[illegible] 198	0.[illegible] [illegible]	0.[illegible] 80	0.034 148	0.021 [illegible]	0.[illegible] [illegible]	0.012 [illegible]	0.015 69
DCP 7	.149	1.755	0.[illegible] 144	0.031 179	0.018 [illegible]	0.015 47	0.012 148	0.009 [illegible]	0.006 [illegible]	0.022 [illegible]	0.023 25
DCP 8	.200	1.529	0.100 126	0.029 [illegible]	0.021 [illegible]	0.012 72	0.014 97	0.012 96	0.[illegible] [illegible]	0.021 [illegible]	0.[illegible] [illegible]
DCP 9	.250	1.421	0.121 122	0.011 106	0.023 [illegible]	0.010 [illegible]	0.018 142	0.003 31	0.[illegible] [illegible]	0.010 [illegible]	0.015 [illegible]
DCP10	.300	1.262	0.118 107	0.008 14	0.021 178	0.[illegible] 8	0.028 116	0.008 [illegible]	0.[illegible] [illegible]	0.014 [illegible]	0.[illegible] [illegible]
DCP11	.399	1.071	0.137 76	0.[illegible] [illegible]	0.024 156	0.008 326	0.017 100	0.013 141	0.[illegible] 47	0.017 [illegible]	0.016 [illegible]
DCP12	.501	0.831	0.125 48	0.010 119	0.014 152	0.017 [illegible]	0.016 [illegible]	0.002 [illegible]	0.[illegible] [illegible]	0.008 [illegible]	0.011 [illegible]
DCP13	.600	0.652	0.125 35	0.014 121	0.012 163	0.013 [illegible]	0.008 57	0.006 73	0.[illegible] [illegible]	0.[illegible] 165	0.[illegible] 77
DCP14	.701	0.526	0.129 25	0.[illegible] [illegible]	0.[illegible] [illegible]	0.013 [illegible]	0.[illegible] 79	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 52
DCP15	.800	0.369	0.119 21	0.007 89	0.005 [illegible]	0.010 [illegible]	0.[illegible] 56	0.[illegible] [illegible]	0.[illegible] [illegible]	0.010 125	0.[illegible] [illegible]
DCP16	.900	0.122	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 12	0.[illegible] [illegible]	0.[illegible] 8	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]
DCP17	.969	0.017	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] 43	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]	0.[illegible] [illegible]

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.070	0.496	2.51	0.0	17.97	12117.4	20

V	Q	PN	CN(MIN)	CN(MAX)	ALPHA.AWAY	AERO DAMP	TDO	EXT DAMP
165.9 (544.2)	71916. (1502.0)	0.285 07	-0.191	1.073	16.71	-0.00155	0.054	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.570	2.515	0	0.060	19	0.019	213	0.009	98	0.017	21	0.005	36	0.014	97	0.029	331	0.016	290
CN		1.004	0.266	92	0.001	301	0.038	191	0.005	178	0.003	339	0.001	111	0.004	19	0.004	219	0.002	351
CM		-0.071	0.029	202	0.002	222	0.002	66	0.000	347	0.001	225	0.001	28	0.000	93	0.003	55	0.002	107
DCP 1	.010	3.581	0.230	157	0.049	323	0.034	54	0.032	250	0.003	304	0.012	124	0.039	95	0.029	61	0.004	92
DCP 2	.020	3.140	0.266	156	0.062	132	0.049	65	0.021	253	0.016	310	0.038	106	0.009	37	0.026	64	0.029	152
DCP 3	.030	2.860	0.347	171	0.085	120	0.017	266	0.015	149	0.047	19	0.010	121	0.012	35	0.018	169	0.018	87
DCP 4	.049	2.919	0.389	158	0.048	312	0.011	220	0.036	288	0.005	264	0.036	113	0.019	339	0.019	211	0.011	91
DCP 5	.074	1.995	0.208	155	0.035	232	0.037	124	0.017	147	0.002	47	0.016	148	0.023	17	0.019	157	0.016	56
DCP 6	.099	1.837	0.170	155	0.015	252	0.045	128	0.027	101	0.013	1	0.013	4	0.016	44	0.017	88	0.019	47
DCP 7	.149	1.648	0.139	148	0.007	277	0.035	151	0.009	149	0.009	279	0.014	316	0.014	29	0.010	111	0.015	134
DCP 8	.200	1.459	0.102	128	0.011	269	0.014	193	0.006	129	0.003	192	0.011	119	0.019	40	0.007	189	0.010	69
DCP 9	.250	1.376	0.120	114	0.018	167	0.035	163	0.014	164	0.011	240	0.011	59	0.019	4	0.011	55	0.009	50
DCP10	.300	1.249	0.100	100	0.012	193	0.009	197	0.010	196	0.010	269	0.011	71	0.012	51	0.000	95	0.007	356
DCP11	.349	1.101	0.090	83	0.001	59	0.010	211	0.020	230	0.011	339	0.006	164	0.011	261	0.004	90	0.012	269
DCP12	.501	0.912	0.087	52	0.004	250	0.019	211	0.009	165	0.004	54	0.007	296	0.009	224	0.016	295	0.004	297
DCP13	.600	0.796	0.103	35	0.005	124	0.011	210	0.010	115	0.007	335	0.004	193	0.009	222	0.018	286	0.004	94
DCP14	.701	0.644	0.103	26	0.012	41	0.006	261	0.007	77	0.007	47	0.004	178	0.007	98	0.019	236	0.009	326
DCP15	.800	0.478	0.104	25	0.010	65	0.004	283	0.010	339	0.003	20	0.001	114	0.007	29	0.013	184	0.012	279
DCP16	.900	0.189	0.064	29	0.014	3	0.003	191	0.004	288	0.004	108	0.001	297	0.004	318	0.011	287	0.007	297
DCP17	.969	0.041	0.019	45	0.004	335	0.003	254	0.007	309	0.001	144	0.004	199	0.002	53	0.006	179	0.007	301

FORCED PITCHING OSCILLATION AIRFOIL MLP 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.52	0.135	0.510	2.83	0.0	-0.01	12119.1	20

V	Q	PN	CN(MIN)	CN(MAX)	ALPHA.AWAY	AERO DAMP	TDO	EXT DAMP
171.2 (561.6)	75454 (1575.9)	0.808 07	-0.027	0.377	2.94	-0.00069	0.900	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.008	2.832	0	0.074	346	0.100	238	0.026	92	0.023	52	0.015	58	0.015	150	0.024	185	0.011	2
CN		0.122	0.252	353	0.005	346	0.004	282	0.004	101	0.001	321	0.001	100	0.001	191	0.003	193	0.001	265
CM		-0.016	0.010	297	0.001	341	0.001	185	0.000	258	0.000	127	0.000	77	0.000	0	0.001	29	0.000	119
DCP 1	.010	-0.861	1.786	342	0.123	32	0.038	170	0.021	148	0.011	112	0.020	75	0.002	316	0.007	259	0.001	190
DCP 2	.020	-0.399	1.304	346	0.032	338	0.017	249	0.017	113	0.002	157	0.003	173	0.002	23	0.003	66	0.004	225
DCP 3	.030	-0.116	1.098	346	0.028	298	0.015	251	0.013	113	0.004	237	0.002	147	0.002	0	0.000	284	0.004	199
DCP 4	.049	0.177	0.909	347	0.024	301	0.012	241	0.012	100	0.003	144	0.001	253	0.006	71	0.003	22	0.002	5
DCP 5	.074	0.309	0.754	347	0.017	316	0.014	266	0.009	94	0.003	210	0.001	23	0.002	73	0.002	317	0.002	141
DCP 6	.099	0.371	0.636	348	0.016	319	0.010	246	0.011	104	0.003	246	0.001	90	0.003	100	0.002	69	0.002	125
DCP 7	.149	0.262	0.459	349	0.016	14	0.016	288	0.008	128	0.001	176	0.002	187	0.004	59	0.001	38	0.002	252
DCP 8	.200	0.207	0.381	355	0.011	337	0.002	252	0.009	106	0.005	87	0.002	45	0.006	77	0.004	82	0.001	250
DCP 9	.250	0.200	0.336	352	0.007	339	0.006	283	0.003	12	0.001	279	0.001	126	0.005	138	0.004	155	0.001	170
DCP10	.300	0.188	0.278	357	-0.006	319	0.006	269	0.001	68	0.000	298	0.002	100	0.004	179	0.003	119	0.003	111
DCP11	.399	0.170	0.224	1	0.006	10	0.005	296	0.004	88	0.003	346	0.004	89	0.002	202	0.004	177	0.001	189
DCP12	.501	0.129	0.168	4	0.002	6	0.005	300	0.002	88	0.004	327	0.001	116	0.002	194	0.004	170	0.003	317
DCP13	.600	0.138	0.127	8	0.001	258	0.003	327	0.002	66	0.001	109	0.002	98	0.001	193	0.005	226	0.001	50
DCP14	.701	0.212	0.098	12	0.000	281	0.002	316	0.001	16	0.001	86	0.004	289	0.002	148	0.005	229	0.002	210
DCP15	.800	0.089	0.051	20	0.003	33	0.002	18	0.004	121	0.003	324	0.002	238	0.001	244	0.007	204	0.004	311
DCP16	.900	-0.099	0.015	54	0.003	174	0.002	358	0.002	29	0.002	319	0.001	232	0.002	111	0.005	192	0.002	316
DCP17	.969	-0.048	0.013	183	0.002	199	0.001	76	0.004	165	0.005	212	0.003	77	0.002	299	0.004	239	0.003	220

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.59	0.197	0.505	2.82	0.0	2.47	12119.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
169.3 (555.5)	74315. (1552.1)	0.79E 07	-0.024	0.646	5.37	-0.00066	0.908	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.473	2.824	0	0.074	1	0.053	241	0.038	115	0.026	49	0.017	33	0.018	187	0.021	239	0.006	37
CN		0.396	0.254	359	0.005	354	0.002	280	0.004	169	0.001	121	0.001	136	0.001	190	0.003	281	0.001	199
CM		-0.011	0.011	301	0.001	292	0.000	48	0.000	65	0.000	16	0.000	7	0.001	27	0.001	92	0.000	339
DCP 1	.010	0.887	1.587	341	0.044	338	0.036	277	0.012	183	0.012	326	0.002	241	0.005	128	0.010	249	0.013	271
DCP 2	.020	0.974	1.314	346	0.022	327	0.006	276	0.015	137	0.003	88	0.004	41	0.003	63	0.000	65	0.003	298
DCP 3	.030	1.069	1.155	346	0.020	302	0.004	279	0.010	128	0.001	86	0.001	120	0.003	56	0.002	296	0.002	303
DCP 4	.049	1.175	0.984	346	0.021	282	0.005	296	0.013	134	0.001	271	0.002	12	0.002	46	0.003	22	0.002	282
DCP 5	.074	1.131	0.782	347	0.015	290	0.008	291	0.010	121	0.003	28	0.001	17	0.003	105	0.004	41	0.003	305
DCP 6	.099	1.064	0.661	348	0.010	336	0.010	306	0.017	178	0.011	98	0.009	2	0.004	278	0.002	151	0.002	20
DCP 7	.149	0.770	0.473	349	0.011	304	0.000	57	0.014	162	0.002	75	0.007	126	0.002	124	0.006	89	0.004	169
DCP 8	.200	0.616	0.390	354	0.011	12	0.001	298	0.012	144	0.001	164	0.001	146	0.001	177	0.005	358	0.002	257
DCP 9	.250	0.549	0.329	352	0.008	0	0.003	312	0.004	145	0.003	291	0.003	153	0.003	166	0.008	295	0.001	137
DCP10	.300	0.490	0.276	353	0.007	9	0.003	261	0.006	175	0.002	157	0.001	175	0.003	184	0.004	248	0.001	167
DCP11	.399	0.409	0.220	1	0.005	69	0.002	107	0.004	223	0.002	162	0.001	96	0.003	257	0.005	287	0.001	241
DCP12	.501	0.309	0.166	6	0.003	36	0.003	303	0.001	242	0.001	83	0.004	164	0.003	347	0.005	256	0.003	147
DCP13	.600	0.274	0.126	9	0.004	19	0.001	316	0.003	118	0.003	28	0.002	151	0.001	347	0.005	303	0.001	236
DCP14	.701	0.308	0.085	12	0.006	353	0.002	242	0.002	216	0.003	230	0.002	108	0.004	186	0.003	224	0.001	271
DCP15	.800	0.139	0.049	22	0.004	39	0.001	264	0.003	198	0.002	147	0.003	277	0.003	177	0.004	305	0.002	53
DCP16	.900	-0.084	0.012	29	0.003	67	0.004	219	0.006	212	0.001	229	0.002	28	0.001	179	0.005	289	0.003	167
DCP17	.969	-0.062	0.011	175	0.004	162	0.002	189	0.004	25	0.000	166	0.003	200	0.004	249	0.007	307	0.002	178

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.53	0.198	0.502	2.82	0.0	4.93	12119.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
168.2 (551.9)	73635. (1537.9)	0.79E 07	-0.019	0.921	7.89	-0.00080	1.000	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.934	2.824	0	0.074	355	0.048	243	0.035	110	0.031	54	0.013	29	0.009	189	0.020	113	0.003	9
CN		0.671	0.249	356	0.008	2	0.001	342	0.001	73	0.003	114	0.002	41	0.001	315	0.005	122	0.001	84
CM		-0.004	0.015	309	0.002	219	0.000	222	0.001	89	0.000	39	0.000	309	0.001	232	0.001	300	0.000	81
DCP 1	.010	2.796	1.889	340	0.129	226	0.027	311	0.035	189	0.069	82	0.029	326	0.010	137	0.024	308	0.018	166
DCP 2	.020	2.506	1.601	346	0.214	248	0.119	140	0.047	41	0.050	122	0.075	15	0.042	269	0.014	324	0.047	234
DCP 3	.030	2.358	1.926	346	0.167	250	0.169	140	0.164	38	0.081	290	0.004	47	0.062	263	0.082	160	0.077	59
DCP 4	.049	2.175	0.906	347	0.127	49	0.130	313	0.082	202	0.059	106	0.027	4	0.002	149	0.015	348	0.022	299
DCP 5	.074	1.965	0.789	347	0.023	15	0.023	322	0.005	151	0.009	122	0.009	36	0.002	318	0.002	57	0.002	119
DCP 6	.099	1.746	0.634	349	0.026	18	0.007	319	0.008	87	0.007	89	0.004	92	0.004	54	0.009	76	0.005	349
DCP 7	.149	1.269	0.469	349	0.026	28	0.003	341	0.007	72	0.002	198	0.002	101	0.001	200	0.001	359	0.002	42
DCP 8	.200	1.022	0.371	356	0.013	27	0.004	329	0.009	60	0.001	146	0.001	256	0.003	92	0.001	254	0.002	192
DCP 9	.250	0.892	0.307	354	0.014	18	0.005	316	0.004	196	0.002	93	0.003	214	0.002	78	0.006	92	0.003	54
DCP10	.300	0.777	0.255	355	0.013	12	0.003	320	0.001	262	0.001	96	0.002	77	0.001	114	0.004	101	0.001	37
DCP11	.399	0.560	0.203	4	0.012	29	0.002	332	0.001	49	0.003	128	0.003	95	0.001	191	0.005	117	0.002	96
DCP12	.501	0.488	0.157	8	0.009	17	0.001	92	0.003	251	0.003	195	0.001	140	0.001	86	0.005	132	0.001	176
DCP13	.600	0.408	0.116	13	0.007	22	0.002	58	0.002	291	0.000	90	0.002	337	0.002	60	0.007	124	0.002	30
DCP14	.701	0.396	0.072	21	0.008	17	0.002	20	0.002	289	0.002	176	0.002	149	0.001	42	0.007	123	0.002	262
DCP15	.800	0.189	0.044	38	0.006	29	0.003	22	0.003	244	0.002	151	0.001	90	0.002	335	0.006	127	0.003	194
DCP16	.900	-0.069	0.015	55	0.004	1	0.004	161	0.001	39	0.000	20	0.004	62	0.002	19	0.006	105	0.001	21
DCP17	.969	-0.072	0.012	181	0.005	297	0.006	8	0.002	337	0.001	64	0.002	330	0.002	46	0.004	148	0.002	2

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.54	0.138	0.501	2.89	0.0	7.45	12119.4	22

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TAB	EXT DAMP
167.5 (549.4)	73199. (1528.8)	0.79E 07	-0.011	1.159	10.28	-0.00109	1.487	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.446	2.890	0	0.090	10	0.089	256	0.015	308	0.007	61	0.010	40	0.012	259	0.005	190	0.006	29
CN		0.894	0.228	13	0.037	318	0.014	141	0.012	355	0.004	270	0.004	256	0.004	123	0.000	160	0.002	14
CM		0.019	0.022	312	0.004	75	0.006	290	0.004	157	0.001	19	0.000	189	0.000	264	0.001	52	0.000	43
DCP 1	.010	4.171	1.180	349	0.424	41	0.151	278	0.096	77	0.040	33	0.047	344	0.007	98	0.008	142	0.030	48
DCP 2	.020	3.862	1.464	355	0.208	41	0.237	318	0.078	109	0.086	343	0.070	76	0.024	268	0.061	98	0.015	61
DCP 3	.030	3.680	1.475	354	0.066	320	0.224	335	0.055	239	0.130	320	0.017	205	0.005	309	0.002	15	0.073	291
DCP 4	.049	3.316	1.063	2	0.214	12	0.253	320	0.226	227	0.097	85	0.196	241	0.044	114	0.077	238	0.050	124
DCP 5	.074	2.658	0.697	13	0.273	342	0.138	244	0.047	240	0.393	194	0.061	142	0.065	199	0.087	89	0.057	50
DCP 6	.099	2.259	0.498	7	0.126	339	0.108	207	0.071	127	0.033	81	0.033	59	0.031	22	0.021	342	0.024	314
DCP 7	.149	1.661	0.362	6	0.050	325	0.051	143	0.039	86	0.021	348	0.011	331	0.003	257	0.006	186	0.002	194
DCP 8	.200	1.297	0.411	6	0.100	265	0.089	148	0.052	52	0.026	359	0.004	292	0.001	200	0.021	119	0.016	43
DCP 9	.250	1.227	0.380	359	0.117	239	0.115	117	0.081	12	0.046	286	0.032	217	0.027	136	0.015	57	0.014	353
DCP10	.300	1.037	0.288	5	0.074	280	0.069	116	0.050	0	0.028	257	0.017	189	0.014	85	0.008	350	0.004	325
DCP11	.399	0.821	0.194	21	0.027	282	0.034	115	0.028	346	0.014	236	0.008	140	0.006	76	0.010	312	0.006	214
DCP12	.501	0.639	0.143	36	0.026	314	0.023	109	0.026	330	0.015	291	0.006	63	0.003	287	0.003	208	0.001	179
DCP13	.600	0.475	0.110	49	0.035	350	0.009	125	0.014	327	0.008	175	0.005	6	0.002	69	0.008	258	0.002	178
DCP14	.701	0.412	0.100	90	0.037	357	0.010	151	0.011	328	0.007	181	0.006	317	0.003	196	0.003	194	0.001	129
DCP15	.800	0.192	0.074	94	0.024	328	0.014	134	0.010	341	0.001	208	0.007	292	0.004	122	0.017	226	0.002	350
DCP16	.900	-0.059	0.027	49	0.019	234	0.017	80	0.007	268	0.007	46	0.002	280	0.002	216	0.005	177	0.001	78
DCP17	.969	-0.076	0.008	12	0.006	213	0.008	83	0.001	276	0.003	349	0.002	114	0.002	342	0.002	83	0.005	287

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.96	0.136	0.507	2.77	0.0	9.90	12121.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TAB	EXT DAMP
170.4 (559.0)	74880. (1563.9)	0.79E 07	-0.355	1.290	11.77	-0.00137	1.993	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.905	2.713	0	0.133	59	0.062	338	0.109	192	0.018	91	0.017	56	0.003	133	0.019	184	0.008	176
CN		0.974	0.198	75	0.089	19	0.026	334	0.026	254	0.010	178	0.002	213	0.004	165	0.003	115	0.003	346
CM		0.004	0.028	274	0.025	97	0.006	93	0.007	32	0.003	304	0.000	209	0.001	231	0.000	19	0.001	171
DCP 1	.010	4.716	0.345	162	0.467	82	0.149	17	0.041	352	0.028	333	0.022	355	0.009	307	0.017	267	0.014	238
DCP 2	.020	4.337	0.364	167	0.645	99	0.181	33	0.018	283	0.050	42	0.065	10	0.049	320	0.026	286	0.006	321
DCP 3	.030	4.047	0.349	172	0.660	97	0.166	40	0.039	85	0.078	41	0.067	349	0.011	0	0.035	23	0.039	340
DCP 4	.049	3.390	0.369	135	0.787	89	0.142	164	0.061	105	0.017	190	0.054	42	0.072	91	0.088	86	0.026	187
DCP 5	.074	2.693	0.478	107	0.395	76	0.192	61	0.163	124	0.132	145	0.094	144	0.105	207	0.068	234	0.074	243
DCP 6	.099	2.348	0.394	99	0.311	60	0.152	8	0.074	4	0.049	19	0.049	66	0.046	67	0.029	53	0.036	130
DCP 7	.149	1.806	0.349	74	0.236	20	0.102	338	0.074	309	0.031	277	0.016	311	0.008	349	0.020	335	0.007	243
DCP 8	.200	1.508	0.357	86	0.215	14	0.131	336	0.083	304	0.047	268	0.029	289	0.027	249	0.019	253	0.025	235
DCP 9	.250	1.347	0.367	96	0.212	356	0.113	309	0.086	275	0.071	234	0.040	217	0.033	293	0.029	182	0.029	151
DCP10	.300	1.139	0.310	55	0.135	349	0.075	307	0.077	261	0.038	207	0.028	221	0.029	167	0.013	126	0.017	149
DCP11	.399	0.899	0.249	65	0.103	343	0.033	309	0.059	269	0.330	195	0.014	205	0.022	146	0.029	87	0.034	73
DCP12	.501	0.679	0.214	68	0.087	329	0.021	273	0.043	237	0.026	151	0.0..	120	0.011	105	0.006	108	0.007	37
DCP13	.600	0.529	0.178	75	0.074	308	0.019	212	0.031	226	0.023	130	0.037	83	0.013	90	0.008	296	0.017	6
DCP14	.701	0.434	0.147	84	0.073	291	0.012	177	0.029	212	0.019	106	0.035	36	0.006	357	0.005	191	0.008	326
DCP15	.800	0.238	0.110	55	0.048	269	0.011	220	0.028	177	0.012	47	0.002	280	0.005	19	0.006	329	0.005	315
DCP16	.900	-0.014	0.088	18	0.042	263	0.021	250	0.017	164	0.007	26	0.037	9	0.003	274	0.035	182	0.008	274
DCP17	.969	-0.052	0.146	13	0.019	276	0.019	278	0.011	189	0.006	135	0.007	49	0.003	4	0.013	37	0.004	344

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.58	0.138	0.501	2.64	0.0	12.44	12121.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAU	EXT DAMP
168.1 (551.6)	73467. (1534.4)	0.79E 07	-0.069	1.319	11.85	-0.00179	2.446	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.444	2.638	0	0.048	348	0.128	174	0.043	116	0.032	30	0.007	58	0.018	225	0.005	188	0.000	354
CN		1.014	0.223	97	0.052	134	0.031	114	0.012	117	0.004	60	0.006	304	0.007	286	0.002	32	0.002	53
CM		-0.009	0.051	207	0.007	225	0.008	176	0.004	243	0.003	201	0.001	154	0.001	126	0.001	268	0.000	48
DCP 1	.010	4.425	0.912	170	0.071	143	0.069	161	0.027	266	0.014	278	0.006	139	0.010	15	0.020	107	0.012	31
DCP 2	.020	4.144	1.122	175	0.073	132	0.179	199	0.039	294	0.057	243	0.030	331	0.020	302	0.023	310	0.010	89
DCP 3	.030	3.926	1.133	189	0.095	178	0.288	204	0.033	276	0.089	222	0.059	352	0.039	261	0.039	348	0.021	187
DCP 4	.049	3.302	1.159	171	0.311	250	0.121	149	0.093	288	0.003	27	0.013	25	0.034	78	0.031	123	0.016	101
DCP 5	.074	2.632	0.830	146	0.236	210	0.036	192	0.051	7	0.013	47	0.015	304	0.029	260	0.030	293	0.012	329
DCP 6	.099	2.304	0.594	129	0.169	154	0.192	152	0.092	278	0.014	241	0.019	315	0.005	290	0.017	32	0.028	341
DCP 7	.149	1.846	0.410	97	0.113	130	0.126	119	0.063	154	0.031	195	0.017	243	0.011	248	0.009	268	0.006	168
DCP 8	.200	1.604	0.408	98	0.169	146	0.118	140	0.044	186	0.016	247	0.028	304	0.020	306	0.016	2	0.000	328
DCP 9	.250	1.473	0.420	82	0.187	119	0.132	115	0.057	149	0.020	224	0.031	232	0.017	284	0.008	327	0.012	79
DCP10	.300	1.260	0.355	76	0.140	120	0.098	101	0.039	147	0.028	165	0.016	296	0.012	232	0.008	336	0.007	59
DCP11	.399	0.999	0.300	75	0.088	114	0.052	79	0.049	121	0.035	87	0.007	101	0.009	293	0.012	135	0.011	100
DCP12	.501	0.739	0.246	67	0.051	97	0.036	14	0.033	89	0.024	42	0.013	33	0.002	336	0.012	143	0.015	85
DCP13	.600	0.563	0.199	62	0.016	97	0.025	355	0.018	65	0.014	21	0.009	334	0.009	251	0.010	39	0.002	305
DCP14	.701	0.443	0.165	55	0.009	259	0.023	344	0.014	23	0.017	338	0.009	330	0.011	348	0.007	352	0.011	280
DCP15	.800	0.276	0.168	38	0.016	17	0.022	375	0.018	33	0.018	8	0.014	321	0.006	350	0.002	229	0.002	140
DCP16	.900	0.045	0.129	21	0.032	30	0.011	343	0.006	355	0.008	3	0.005	288	0.006	309	0.007	100	0.006	189
DCP17	.969	-0.018	0.054	24	0.020	45	0.011	46	0.006	12	0.004	276	0.002	250	0.006	316	0.005	46	0.006	13

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.57	0.139	0.498	2.64	0.0	14.89	12121.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAU	EXT DAMP
166.8 (547.2)	72539. (1515.0)	0.79E 07	-0.092	1.220	13.96	-0.00190	2.578	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.886	2.643	0	0.067	346	0.033	246	0.052	133	0.017	35	0.009	45	0.014	182	0.013	219	0.002	340
CN		1.006	0.167	89	0.038	135	0.019	220	0.011	177	0.003	150	0.002	322	0.001	109	0.001	281	0.001	293
CM		-0.047	0.045	213	0.011	251	0.002	308	0.002	296	0.002	276	0.001	11	0.000	40	0.001	229	0.002	192
DCP 1	.010	3.733	0.308	158	0.072	281	0.008	350	0.006	227	0.008	348	0.007	89	0.010	71	0.013	80	0.022	127
DCP 2	.020	3.473	0.456	155	0.114	283	0.011	119	0.010	161	0.020	354	0.019	129	0.023	187	0.007	88	0.013	161
DCP 3	.030	3.342	0.716	173	0.293	299	0.122	349	0.034	156	0.040	279	0.031	20	0.010	152	0.021	233	0.026	97
DCP 4	.049	2.646	0.623	154	0.104	210	0.060	277	0.027	187	0.007	201	0.002	51	0.018	198	0.009	314	0.023	290
DCP 5	.074	2.178	0.481	145	0.092	191	0.062	298	0.040	179	0.004	226	0.020	17	0.010	78	0.024	305	0.015	280
DCP 6	.099	1.995	0.359	137	0.084	185	0.062	240	0.039	205	0.023	154	0.005	261	0.028	88	0.012	244	0.017	249
DCP 7	.149	1.731	0.288	119	0.106	159	0.058	249	0.022	234	0.017	312	0.011	98	0.013	1	0.017	177	0.009	235
DCP 8	.200	1.517	0.229	110	0.095	169	0.025	290	0.008	183	0.019	7	0.011	137	0.012	18	0.009	289	0.010	299
DCP 9	.250	1.432	0.251	99	0.085	149	0.039	230	0.021	255	0.012	277	0.011	253	0.012	171	0.012	323	0.008	277
DCP10	.300	1.275	0.237	94	0.078	140	0.038	188	0.016	209	0.014	213	0.013	323	0.004	285	0.008	141	0.014	169
DCP11	.399	1.084	0.228	79	0.049	120	0.027	217	0.019	153	0.027	192	0.012	333	0.011	355	0.015	16	0.008	230
DCP12	.501	0.855	0.212	60	0.065	117	0.015	158	0.006	157	0.010	146	0.015	267	0.009	247	0.014	266	0.012	184
DCP13	.600	0.680	0.193	45	0.042	102	0.014	151	0.012	180	0.021	121	0.009	296	0.006	164	0.012	142	0.014	102
DCP14	.701	0.549	0.186	43	0.043	72	0.003	127	0.013	142	0.018	62	0.007	140	0.011	147	0.011	98	0.018	67
DCP15	.800	0.378	0.173	38	0.037	56	0.003	195	0.010	119	0.000	49	0.002	287	0.004	224	0.005	49	0.013	341
DCP16	.900	0.135	0.119	41	0.026	48	0.005	73	0.009	99	0.011	12	0.013	199	0.005	354	0.010	346	0.016	324
DCP17	.969	0.015	0.047	48	0.018	46	0.004	123	0.006	181	0.003	160	0.006	155	0.005	46	0.001	268	0.008	316

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.N	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.60	0.140	0.497	2.67	0.0	17.60	12121.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
166.2 (545.2)	72304. (1510.1)	0.798 07	-0.112	1.197	17.41	-0.00181	2.448	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.596	2.666 0	0.066 18	0.024 201	0.058 55	0.033 30	0.005 62	0.017 202	0.008 280	0.018 5
CN		1.012	0.132 85	0.019 30	0.036 208	0.006 44	0.007 79	0.003 294	0.006 220	0.003 197	0.004 149
CM		-0.069	0.036 222	0.005 217	0.001 328	0.001 111	0.001 214	0.001 5	0.002 93	0.001 33	0.001 268
DCP 1	.01C	3.651	0.376 151	0.058 46	0.058 26	0.007 303	0.022 40	0.024 28	0.006 104	0.033 322	0.013 258
DCP 2	.020	3.161	0.342 151	0.085 83	0.067 22	0.011 6	0.027 11	0.012 64	0.019 126	0.009 266	0.005 318
DCP 3	.03C	2.820	0.441 167	0.066 66	0.043 327	0.033 0	0.034 48	0.015 168	0.015 67	0.018 270	0.027 284
DCP 4	.049	2.411	0.328 144	0.054 307	0.021 201	0.003 72	0.012 258	0.010 332	0.001 120	0.019 0	0.015 40
DCP 5	.074	2.059	0.202 139	0.083 254	0.034 210	0.041 107	0.035 176	0.004 115	0.009 168	0.009 191	0.003 3
DCP 6	.099	1.917	0.150 121	0.091 249	0.040 207	0.023 84	0.009 111	0.003 283	0.013 298	0.010 125	0.023 218
DCP 7	.149	1.687	0.148 117	0.012 239	0.041 230	0.028 98	0.029 137	0.018 258	0.019 65	0.013 335	0.016 162
DCP 8	.200	1.448	0.153 120	0.002 204	0.011 330	0.020 68	0.026 107	0.016 304	0.005 23	0.004 272	0.010 304
DCP 9	.250	1.280	0.184 110	0.014 257	0.012 277	0.008 78	0.015 106	0.008 224	0.006 152	0.002 232	0.008 140
DCP10	.300	1.249	0.183 96	0.013 167	0.006 259	0.010 77	0.013 33	0.009 68	0.006 239	0.005 286	0.008 130
DCP11	.399	1.106	0.202 81	0.025 73	0.013 158	0.024 22	0.017 56	0.009 307	0.017 247	0.008 266	0.008 160
DCP12	.501	0.999	0.183 69	0.021 54	0.009 114	0.015 39	0.015 97	0.009 221	0.010 148	0.011 197	0.028 133
DCP13	.600	0.749	0.166 58	0.022 20	0.003 300	0.010 305	0.015 27	0.012 222	0.008 222	0.017 283	0.018 100
DCP14	.701	0.637	0.152 42	0.019 33	0.010 230	0.010 274	0.001 177	0.003 124	0.017 230	0.005 103	0.005 4
DCP15	.800	0.473	0.141 41	0.019 38	0.007 159	0.000 290	0.007 226	0.006 51	0.006 247	0.006 25	0.001 289
DCP16	.900	0.191	0.109 43	0.021 28	0.013 149	0.004 169	0.005 148	0.006 169	0.014 216	0.005 147	0.004 309
DCP17	.969	0.094	0.046 58	0.015 3	0.004 50	0.007 106	0.002 347	0.002 336	0.007 1	0.007 117	0.003 280

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.N	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	60.04	0.211	0.498	3.12	0.0	-0.02	12129.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
166.6 (546.5)	73932. (1544.1)	0.808 07	-0.731	0.358	3.23	-0.00061	0.844	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.018	3.119 0	0.002 315	0.003 202	0.018 152	0.002 161	0.036 64	0.003 173	0.007 216	0.004 256
CN		0.112	0.244 358	0.007 332	0.005 290	0.003 220	0.001 241	0.003 125	0.002 299	0.001 107	0.001 154
CM		-0.015	0.016 296	0.001 254	0.001 98	0.001 69	0.000 155	0.001 330	0.001 93	0.000 290	0.000 332
DCP 1	.010	-0.834	1.803 339	0.078 2	0.030 131	0.015 98	0.014 173	0.034 48	0.005 304	0.007 60	0.013 121
DCP 2	.020	-0.463	1.315 346	0.045 300	0.010 185	0.011 167	0.010 169	0.034 74	0.001 246	0.001 101	0.002 147
DCP 3	.030	-0.169	1.101 345	0.341 279	0.012 199	0.009 162	0.006 162	0.009 97	0.005 290	0.002 103	0.003 116
DCP 4	.049	0.140	0.914 347	0.040 277	0.010 212	0.006 118	0.007 161	0.005 48	0.008 340	0.002 275	0.002 0
DCP 5	.074	0.290	0.756 347	0.029 283	0.008 236	0.004 102	0.005 197	0.004 42	0.002 8	0.001 276	0.003 106
DCP 6	.099	0.358	0.631 349	0.025 295	0.008 240	0.005 136	0.004 183	0.003 41	0.003 357	0.002 294	0.002 227
DCP 7	.149	0.262	0.451 351	0.015 346	0.013 274	0.003 162	0.007 241	0.007 101	0.007 16	0.006 247	0.002 358
DCP 8	.200	0.195	0.386 359	0.013 307	0.004 206	0.004 185	0.002 183	0.003 125	0.006 28	0.002 14	0.003 189
DCP 9	.250	0.181	0.325 355	0.007 321	0.007 262	0.001 246	0.002 179	0.002 6	0.004 276	0.004 174	0.005 79
DCP10	.300	0.183	0.271 357	0.010 336	0.006 264	0.004 237	0.005 200	0.004 115	0.004 224	0.001 145	0.002 289
DCP11	.399	0.169	0.220 11	0.008 347	0.006 258	0.008 230	0.005 268	0.003 92	0.004 274	0.003 110	0.002 119
DCP12	.501	0.116	0.166 16	0.011 13	0.004 210	0.004 260	0.003 298	0.004 180	0.001 54	0.001 56	0.004 297
DCP13	.600	0.128	0.124 23	0.007 27	0.003 236	0.003 274	0.003 344	0.007 119	0.003 288	0.002 98	0.001 199
DCP14	.701	0.203	0.085 39	0.003 93	0.005 276	0.002 246	0.004 332	0.007 169	0.005 282	0.002 192	0.002 196
DCP15	.800	0.083	0.052 43	0.006 63	0.007 300	0.006 246	0.002 90	0.004 197	0.003 257	0.004 44	0.002 194
DCP16	.900	-0.103	0.021 74	0.001 344	0.007 296	0.005 195	0.001 122	0.002 195	0.000 289	0.001 86	0.004 119
DCP17	.969	-0.041	0.020 193	0.003 135	0.004 221	0.003 39	0.003 269	0.003 193	0.005 103	0.004 75	0.003 314

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.89	0.212	0.496	3.13	0.0	2.50	12123.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
165.9 (544.2)	73616. (1537.5)	0.808 07	-0.028	0.649	5.74	-0.00067	0.924	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.499	3.132	0	0.100	317	0.003	184	0.017	176	0.029	93	0.024	91	0.013	104	0.009	218	0.000	227
CN		0.305	0.246	358	0.008	336	0.001	179	0.002	218	0.002	147	0.002	96	0.008	118	0.003	5	0.001	291
CM		-0.009	0.018	296	0.002	233	0.000	14	0.000	127	0.001	23	0.000	23	0.002	328	0.000	164	0.000	184
DCP 1	.010	1.033	1.047	339	0.028	265	0.025	171	0.005	314	0.009	357	0.013	92	0.017	338	0.011	317	0.008	242
DCP 2	.020	0.986	1.323	346	0.041	289	0.009	129	0.005	158	0.011	43	0.010	143	0.020	357	0.003	9	0.007	292
DCP 3	.030	1.064	1.190	345	0.041	279	0.009	133	0.002	105	0.008	98	0.002	284	0.016	92	0.009	55	0.002	330
DCP 4	.049	1.172	0.981	346	0.040	271	0.008	156	0.006	136	0.003	68	0.009	31	0.012	129	0.008	85	0.002	251
DCP 5	.074	1.130	0.779	347	0.031	277	0.003	185	0.002	138	0.008	68	0.003	323	0.019	126	0.005	66	0.004	251
DCP 6	.099	1.064	0.651	348	0.024	312	0.011	279	0.016	174	0.012	81	0.003	321	0.01	74	0.003	36	0.003	287
DCP 7	.149	0.784	0.470	351	0.019	282	0.003	185	0.010	164	0.004	21	0.010	105	0.005	19	0.006	72	0.004	123
DCP 8	.200	0.616	0.386	358	0.015	336	0.000	174	0.003	167	0.003	185	0.002	287	0.016	113	0.006	145	0.004	317
DCP 9	.250	0.541	0.324	357	0.013	342	0.004	116	0.000	161	0.002	135	0.003	127	0.020	88	0.003	304	0.006	261
DCP10	.300	0.492	0.272	358	0.010	341	0.003	112	0.004	245	0.003	104	0.007	93	0.017	119	0.007	18	0.004	239
DCP11	.399	0.416	0.217	13	0.008	7	0.003	267	0.005	284	0.002	192	0.005	126	0.011	120	0.00	338	0.001	76
DCP12	.501	0.300	0.166	18	0.009	6	0.003	121	0.002	237	0.003	209	0.005	134	0.011	153	0.002	353	0.001	303
DCP13	.600	0.268	0.130	24	0.009	23	0.002	155	0.002	285	0.006	155	0.022	262	0.008	125	0.009	319	0.002	294
DCP14	.701	0.392	0.085	34	0.007	15	0.002	167	0.002	224	0.003	186	0.004	16	0.010	164	0.004	347	0.007	55
DCP15	.800	0.138	0.094	51	0.009	48	0.001	233	0.002	8	0.003	221	0.005	249	0.004	85	0.002	147	0.001	195
DCP16	.900	-0.089	0.025	81	0.003	92	0.001	144	0.002	238	0.006	191	0.001	307	0.013	88	0.004	355	0.003	190
DCP17	.969	-0.063	0.016	179	0.001	306	0.004	283	0.004	13	0.007	355	0.004	133	0.018	242	0.004	133	0.006	230

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.93	0.213	0.494	3.16	0.0	4.94	12123.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
164.9 (541.0)	73008. (1524.8)	0.805 07	-0.024	0.927	8.28	-0.00074	1.011	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.940	3.156	0	0.099	317	0.199	178	0.017	187	0.013	45	0.020	46	0.014	271	0.004	291	0.007	262
CN		0.665	0.245	359	0.009	328	0.004	271	0.002	164	0.002	70	0.003	38	0.009	169	0.001	65	0.001	172
CM		-0.009	0.029	298	0.002	211	0.001	104	0.001	31	0.000	329	0.001	225	0.002	336	0.000	177	0.001	326
DCP 1	.010	2.878	1.887	336	0.171	219	0.023	174	0.050	178	0.062	62	0.035	304	0.000	243	0.014	260	0.024	191
DCP 2	.020	2.683	1.997	345	0.249	249	0.160	195	0.055	25	0.042	119	0.007	4	0.072	264	0.019	152	0.035	219
DCP 3	.030	2.936	1.329	344	0.178	241	0.179	132	0.191	27	0.101	282	0.031	140	0.093	259	0.076	138	0.041	27
DCP 4	.049	2.162	0.919	346	0.094	35	0.092	295	0.077	188	0.042	60	0.008	304	0.019	119	0.037	318	0.048	219
DCP 5	.074	1.941	0.789	347	0.029	340	0.013	271	0.010	196	0.009	108	0.014	92	0.015	229	0.011	198	0.009	164
DCP 6	.099	1.735	0.629	350	0.027	354	0.006	219	0.004	207	0.008	76	0.033	49	0.019	195	0.007	66	0.007	329
DCP 7	.149	1.298	0.463	351	0.023	1	0.005	218	0.003	172	0.009	141	0.001	129	0.006	345	0.002	315	0.003	228
DCP 8	.200	1.012	0.362	1	0.017	358	0.006	287	0.004	160	0.004	75	0.003	335	0.021	121	0.002	69	0.001	70
DCP 9	.250	0.879	0.308	348	0.016	359	0.011	237	0.005	150	0.003	78	0.005	123	0.023	123	0.003	356	0.005	298
DCP10	.300	0.777	0.258	0	0.012	358	0.009	219	0.003	98	0.001	194	0.004	129	0.029	148	0.004	62	0.001	216
DCP11	.399	0.641	0.211	15	0.010	346	0.004	299	0.002	181	0.001	33	0.004	106	0.018	154	0.002	5	0.004	44
DCP12	.501	0.478	0.165	21	0.010	9	0.004	250	0.006	179	0.005	241	0.005	87	0.012	174	0.000	277	0.001	119
DCP13	.600	0.398	0.122	31	0.007	17	0.001	167	0.002	169	0.002	3	0.009	341	0.012	144	0.003	71	0.002	151
DCP14	.701	0.391	0.089	42	0.009	1	0.004	293	0.003	203	0.004	147	0.003	19	0.010	193	0.001	171	0.002	107
DCP15	.800	0.187	0.059	56	0.007	1	0.004	271	0.006	246	0.002	63	0.004	34	0.008	164	0.003	314	0.004	164
DCP16	.900	-0.070	0.023	71	0.006	315	0.004	129	0.005	177	0.001	116	0.006	43	0.009	77	0.004	16	0.003	279
DCP17	.969	-0.071	0.009	173	0.003	111	0.004	127	0.002	187	0.005	63	0.005	90	0.013	255	0.003	174	0.008	145

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

SPACE PITCHING OSCILLATION AIRCRAFT NLR 1

TUNED HZ	NATIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	60.06	0.219	0.494	9.19	0.0	7.68	12123.4	20

V	Q	PH	CM(ALPHA)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
164.7 (540.2)	72883 (1522.2)	0.809 07	-0.016	1.170	10.41	-0.30107	1.359	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.478	3.126 0	0.144 350	0.139 156	0.015 142	0.010 36	0.015 194	0.005 162	0.006 289	0.010 301
CM		0.005	0.259 17	0.016 298	0.012 194	0.008 299	0.002 179	0.004 144	0.004 54	0.003 313	0.001 298
CN		0.011	0.128 298	0.006 48	0.005 248	0.009 100	0.001 305	0.000 0	0.002 246	0.001 136	0.001 67
RED 1	.010	4.307	1.387 344	0.331 19	0.199 248	0.008 43	0.031 316	0.022 313	0.012 60	0.007 310	0.006 19
RED 2	.020	3.869	1.601 332	0.130 53	0.190 314	0.063 88	0.102 315	0.062 48	0.019 286	0.007 16	0.004 189
RED 3	.030	3.509	1.655 332	0.081 8	0.271 310	0.127 189	0.133 329	0.083 298	0.026 272	0.015 138	0.006 267
RED 4	.040	3.170	1.778 6	0.302 350	0.265 289	0.208 202	0.091 86	0.090 271	0.025 71	0.101 227	0.129 184
RED 5	.049	2.840	0.790 12	0.288 331	0.177 227	0.055 205	0.106 179	0.078 113	0.069 87	0.003 66	0.078 347
RED 6	.059	2.276	0.617 6	0.142 297	0.157 176	0.094 80	0.036 34	0.021 23	0.006 282	0.034 274	0.022 298
RED 7	.149	1.684	0.402 3	0.133 256	0.138 139	0.364 91	0.327 306	0.019 240	0.012 147	0.011 117	0.009 150
RED 8	.200	1.375	0.429 0	0.096 249	0.081 133	0.066 21	0.020 300	0.017 259	0.025 170	0.039 11	0.015 197
RED 9	.250	1.101	0.367 2	0.093 219	0.096 87	0.073 314	0.044 291	0.010 176	0.029 33	0.008 293	0.004 231
RED10	.300	1.022	0.298 10	0.064 224	0.066 85	0.039 300	0.022 196	0.013 117	0.024 39	0.015 258	0.014 147
RED11	.399	0.817	0.225 30	0.039 266	0.019 92	0.021 309	0.015 177	0.002 19	0.015 99	0.010 219	0.005 24
RED12	.501	0.602	0.189 42	0.024 240	0.015 84	0.019 278	0.007 121	0.008 313	0.004 45	0.004 74	0.007 278
RED13	.600	0.446	0.160 42	0.031 310	0.011 114	0.012 282	0.009 128	0.005 295	0.006 60	0.002 62	0.002 124
RED14	.701	0.409	0.140 79	0.020 314	0.011 95	0.012 267	0.007 108	0.003 214	0.012 85	0.003 345	0.001 230
RED15	.800	0.192	0.106 93	0.019 291	0.011 68	0.010 249	0.009 82	0.007 179	0.009 53	0.003 332	0.002 341
RED16	.900	-0.065	0.049 66	0.020 216	0.014 15	0.006 169	0.010 320	0.007 169	0.001 313	0.009 308	0.007 247
RED17	.965	-0.077	0.009 74	0.015 206	0.007 18	0.004 173	0.002 296	0.003 171	0.015 109	0.004 359	0.001 277

SPACE PITCHING OSCILLATION AIRCRAFT NLR 1

TUNED HZ	NATIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	60.13	0.212	0.495	2.00	0.0	0.94	12125.1	20

V	Q	PH	CM(ALPHA)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
165.7 (543.7)	73592. (1537.0)	0.808 07	-0.372	1.343	12.88	-0.30063	0.861	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.997	2.003 3	0.356 24	0.127 147	0.048 152	0.012 78	0.029 42	0.037 188	0.012 248	0.004 4
CM		0.000	0.324 93	0.079 320	0.019 199	0.019 127	0.008 37	0.004 17	0.001 5	0.001 68	0.002 98
CN		-0.001	0.015 213	0.004 62	0.008 329	0.006 293	0.002 166	0.002 287	0.002 157	0.001 359	0.001 137
RED 1	.010	4.400	0.262 96	0.566 61	0.099 291	0.010 266	0.066 322	0.021 250	0.019 193	0.025 246	0.016 145
RED 2	.020	4.190	0.466 93	0.712 76	0.131 261	0.013 58	0.105 339	0.035 299	0.002 179	0.021 256	0.019 188
RED 3	.030	3.997	0.491 73	0.999 80	0.133 333	0.129 91	0.004 237	0.005 338	0.009 344	0.042 291	0.009 64
RED 4	.049	3.133	0.812 91	0.435 56	0.160 97	0.133 94	0.097 74	0.027 89	0.027 311	0.027 264	0.009 289
RED 5	.034	2.690	0.683 82	0.474 39	0.000 91	0.175 57	0.106 52	0.004 66	0.029 85	0.001 98	0.012 60
RED 6	.099	2.363	0.598 67	0.339 4	0.050 293	0.131 358	0.075 325	0.026 331	0.009 295	0.021 339	0.021 344
RED 7	.149	1.827	0.607 49	0.282 338	0.093 284	0.099 274	0.051 218	0.005 269	0.005 296	0.027 169	0.022 137
RED 8	.200	1.509	0.558 51	0.241 335	0.067 249	0.096 280	0.041 219	0.024 244	0.035 201	0.014 186	0.019 178
RED 9	.250	1.297	0.496 44	0.208 309	0.069 265	0.078 217	0.048 195	0.025 156	0.046 104	0.032 52	0.021 29
RED10	.300	1.129	0.440 41	0.178 300	0.057 229	0.057 192	0.031 138	0.014 123	0.026 76	0.025 0	0.018 339
RED11	.399	0.921	0.390 39	0.152 296	0.043 247	0.044 193	0.024 101	0.016 47	0.014 27	0.029 341	0.018 296
RED12	.501	0.691	0.376 48	0.134 276	0.052 191	0.046 133	0.037 49	0.016 14	0.010 342	0.007 241	0.006 207
RED13	.600	0.519	0.374 54	0.118 265	0.038 153	0.032 111	0.025 13	0.005 49	0.013 319	0.006 236	0.006 197
RED14	.701	0.443	0.312 61	0.104 245	0.034 119	0.025 107	0.027 344	0.013 144	0.009 0	0.007 201	0.011 44
RED15	.800	0.260	0.181 42	0.103 227	0.031 111	0.026 84	0.019 282	0.011 98	0.012 277	0.006 144	0.006 47
RED16	.900	-0.014	0.115 13	0.068 221	0.026 142	0.025 55	0.012 279	0.006 119	0.006 149	0.014 132	0.011 342
RED17	.969	-0.049	0.056 5	0.037 242	0.014 178	0.014 58	0.009 223	0.008 91	0.001 32	0.008 264	0.007 199

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.19	0.214	0.492	2.91	0.0	12.49	12129.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TAU	EXT DAMP
164.6 (540.1)	72979. (1524.2)	0.000 07	-0.139	1.471	13.76	-0.00124	1.761	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.486	2.912 9	0.144 93	0.081 223	0.027 156	0.018 67	0.012 [illegible]	0.012 222	0.007 96	0.002 89
CN		1.098	0.360 72	0.062 40	0.049 352	0.016 274	0.002 135	0.004 335	0.001 84	0.005 348	0.004 192
CM		-0.017	0.074 202	0.017 127	0.020 179	0.006 53	0.002 302	0.001 136	0.000 274	0.001 194	0.000 48
RCP 1	.010	4.365	0.864 195	0.347 78	0.087 191	0.044 111	0.016 169	0.037 143	0.021 87	0.010 255	0.018 145
RCP 2	.020	4.264	0.984 195	0.290 78	0.134 171	0.012 340	0.096 215	0.013 163	0.046 207	0.016 178	0.020 214
RCP 3	.030	3.734	1.231 185	0.919 108	0.244 141	0.009 347	0.100 210	0.049 260	0.066 197	0.051 272	0.047 217
RCP 4	.049	3.239	1.151 140	0.145 177	0.199 151	0.102 238	0.085 291	0.057 276	0.055 279	0.029 328	0.018 248
RCP 5	.074	2.605	0.954 112	0.279 105	0.164 145	0.117 256	0.075 278	0.040 341	0.045 51	0.011 95	0.040 156
RCP 6	.099	2.122	0.716 108	0.218 65	0.195 134	0.045 144	0.073 160	0.058 219	0.020 245	0.048 279	0.022 267
RCP 7	.149	1.850	0.478 89	0.194 97	0.207 59	0.030 34	0.091 103	0.049 140	0.031 112	0.029 173	0.029 160
RCP 8	.200	1.510	0.390 79	0.175 61	0.162 48	0.030 67	0.051 48	0.022 139	0.027 97	0.020 112	0.029 197
RCP 9	.250	1.359	0.576 68	0.164 44	0.140 10	0.055 14	0.055 12	0.045 49	0.026 31	0.036 56	0.014 42
RCP10	.300	1.173	0.494 43	0.111 41	0.120 4	0.046 354	0.041 343	0.039 1	0.021 323	0.020 349	0.013 321
RCP11	.399	0.979	0.475 64	0.079 34	0.113 357	0.032 312	0.018 344	0.029 295	0.009 14	0.020 296	0.009 297
RCP12	.501	0.797	0.429 54	0.061 7	0.108 322	0.030 276	0.014 298	0.015 308	0.009 294	0.007 316	0.007 119
RCP13	.600	0.602	0.371 49	0.046 325	0.093 301	0.039 299	0.028 182	0.021 286	0.014 291	0.002 169	0.006 156
RCP14	.701	0.496	0.318 42	0.047 291	0.090 278	0.031 243	0.018 146	0.010 235	0.006 86	0.007 338	0.006 220
RCP15	.800	0.311	0.274 26	0.054 301	0.068 247	0.022 209	0.013 100	0.007 196	0.002 273	0.001 195	0.008 214
RCP16	.900	0.654	0.189 13	0.075 319	0.092 250	0.035 187	0.010 108	0.009 107	0.007 121	0.010 23	0.006 19
RCP17	.969	-0.017	0.082 19	0.046 340	0.029 276	0.030 240	0.008 137	0.030 196	0.004 330	0.003 8	0.007 104

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.18	0.215	0.491	2.93	0.0	14.96	12129.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TAU	EXT DAMP
164.0 (537.9)	72596. (1516.2)	0.000 07	-0.133	1.488	19.21	-0.00169	2.236	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.958	2.926 0	0.057 [illegible]	0.043 195	0.032 72	0.031 351	0.005 90	0.019 176	0.002 1	0.007 327
CN		1.025	0.301 75	0.042 73	0.013 109	0.010 8	0.004 23	0.004 167	0.001 117	0.001 166	0.007 199
CM		-0.094	0.074 210	0.019 202	0.005 218	0.004 179	0.001 251	0.002 5	0.000 161	0.001 335	0.002 306
RCP 1	.010	3.995	0.922 159	0.108 283	0.028 232	0.041 301	0.052 315	0.028 334	0.015 61	0.025 356	0.023 100
RCP 2	.020	3.965	0.968 161	0.105 246	0.033 119	0.035 313	0.004 22	0.029 95	0.019 11	0.023 115	0.019 221
RCP 3	.030	3.442	1.295 171	0.276 234	0.022 27	0.063 264	0.077 16	0.060 109	0.026 164	0.020 131	0.041 223
RCP 4	.049	2.941	0.849 140	0.280 219	0.128 313	0.087 29	0.023 118	0.032 133	0.015 210	0.007 272	0.007 340
RCP 5	.074	2.416	0.993 119	0.193 176	0.038 230	0.046 316	0.024 358	0.033 60	0.009 352	0.020 11	0.006 309
RCP 6	.099	2.180	0.495 109	0.162 148	0.035 261	0.046 246	0.037 276	0.012 41	0.011 67	0.019 5	0.019 336
RCP 7	.149	1.821	0.420 95	0.180 137	0.052 192	0.021 131	0.033 249	0.018 169	0.004 9	0.006 268	0.006 92
RCP 8	.200	1.561	0.454 96	0.140 145	0.088 201	0.012 260	0.026 347	0.022 292	0.009 284	0.019 67	0.001 334
RCP 9	.250	1.439	0.441 80	0.179 100	0.074 153	0.026 134	0.003 353	0.007 262	0.005 291	0.008 291	0.009 126
RCP10	.300	1.272	0.433 71	0.147 87	0.072 123	0.016 111	0.016 165	0.016 333	0.008 294	0.009 228	0.734 143
RCP11	.399	1.074	0.492 69	0.146 72	0.068 108	0.034 101	0.024 149	0.004 270	0.008 137	0.021 292	0.004 174
RCP12	.501	0.930	0.413 54	0.143 52	0.060 64	0.035 22	0.019 58	0.015 136	0.009 116	0.012 168	0.019 77
RCP13	.600	0.636	0.354 48	0.112 39	0.331 92	0.024 1	0.009 94	0.004 272	0.007 314	0.010 91	0.014 335
RCP14	.701	0.507	0.291 38	0.090 18	0.010 4	0.023 320	0.005 30	0.020 134	0.007 73	0.006 148	0.004 98
RCP15	.800	0.358	0.260 33	0.096 359	0.017 346	0.016 345	0.002 320	0.010 199	0.003 84	0.003 295	0.011 151
RCP16	.900	0.199	0.184 33	0.062 351	0.018 335	0.013 326	0.012 26	0.013 149	0.000 280	0.004 91	0.010 149
RCP17	.969	0.007	0.085 47	0.037 7	0.011 328	0.011 338	0.003 49	0.008 143	0.005 314	0.011 189	0.002 199

FORCED PITCHING OSCILLATION AIRFOIL N - 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.18	0.215	0.491	2.96	0.0	17.53	12129.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	FRT DAMP
163.6 (536.8)	72515. (1514.5)	0.000 07	-0.134	1.310	17.78	-0.00177	2.407	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.530	2.964 0	0.040 328	0.003 195	0.034 92	0.032 356	0.004 121	0.008 187	0.007 140	0.006 65
CN		1.015	0.297 76	0.034 61	0.008 173	0.009 94	0.002 126	0.003 309	0.005 131	0.001 1	0.005 111
CM		-0.065	0.060 221	0.012 200	0.009 246	0.003 240	0.001 259	0.000 351	0.002 204	0.000 33	0.002 327
RCP 1	.010	3.927	0.711 151	0.042 252	0.070 42	0.034 230	0.009 248	0.019 86	0.011 321	0.007 182	0.013 92
RCP 2	.020	3.247	0.461 193	0.063 160	0.056 84	0.003 263	0.027 91	0.018 358	0.014 289	0.020 141	0.006 139
RCP 3	.030	2.797	0.304 158	0.029 123	0.003 231	0.013 218	0.040 325	0.007 130	0.029 79	0.013 195	0.016 92
RCP 4	.049	2.515	0.518 122	0.062 103	0.008 126	0.019 214	0.007 357	0.022 356	0.012 279	0.016 90	0.012 61
RCP 5	.074	2.184	0.440 102	0.050 120	0.019 247	0.012 239	0.015 328	0.007 216	0.018 105	0.015 79	0.015 139
RCP 6	.099	1.992	0.311 97	0.061 101	0.017 232	0.010 66	0.025 44	0.008 288	0.009 82	0.011 298	0.015 37
RCP 7	.149	1.720	0.281 89	0.040 131	0.034 219	0.002 323	0.007 177	0.019 323	0.027 256	0.006 268	0.017 338
RCP 8	.200	1.503	0.336 92	0.035 140	0.026 259	0.008 168	0.020 172	0.009 91	0.009 307	0.014 344	0.022 48
RCP 9	.250	1.385	0.329 81	0.045 116	0.040 210	0.034 185	0.015 278	0.006 43	0.004 134	0.017 52	0.009 5
RCP10	.300	1.267	0.304 73	0.050 102	0.022 203	0.023 125	0.012 214	0.009 281	0.010 189	0.015 19	0.008 210
RCP11	.399	1.093	0.325 69	0.054 75	0.020 230	0.019 81	0.017 230	0.014 286	0.010 231	0.006 273	0.004 12
RCP12	.501	0.996	0.332 62	0.051 62	0.021 142	0.008 119	0.013 161	0.004 163	0.029 193	0.008 265	0.012 141
RCP13	.600	0.725	0.302 55	0.063 36	0.030 68	0.026 89	0.017 118	0.020 262	0.016 117	0.010 167	0.013 187
RCP14	.701	0.626	0.274 45	0.053 21	0.013 121	0.018 73	0.019 100	0.003 216	0.014 64	0.008 121	0.013 135
RCP15	.800	0.474	0.245 43	0.057 8	0.010 78	0.011 48	0.013 43	0.011 98	0.011 97	0.003 192	0.014 142
RCP16	.900	0.178	0.175 47	0.039 1	0.017 45	0.012 8	0.016 331	0.004 66	0.006 22	0.008 919	0.007 47
RCP17	.969	0.093	0.095 61	0.015 38	0.008 34	0.009 28	0.009 76	0.007 259	0.004 40	0.002 180	0.001 329

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	29.11	0.060	0.909	2.64	0.0	-0.01	12127.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TAU	FRT DAMP
197.4 (646.8)	103977. (2171.6)	0.000 07	-0.024	0.411	2.47	-0.00073	1.104	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.013	2.645 0	0.063 350	0.004 215	0.023 122	0.027 49	0.015 33	0.029 193	0.018 150	0.011 8
CN		0.120	0.293 352	0.005 327	0.000 269	0.001 300	0.000 148	0.030 81	0.000 291	0.002 172	0.001 148
CM		-0.015	0.098 321	0.000 353	0.000 116	0.000 168	0. 10 146	0.000 159	0.000 330	0.000 330	0.000 67
RCP 1	.010	-0.069	2.000 347	0.104 59	0.051 127	0.024 69	0.016 108	0.007 21 /	0.002 355	0.003 230	0.007 120
RCP 2	.020	-0.090	1.419 349	0.095 8	0.045 140	0.050 218	0.052 293	0.056 10	0. 15 86	0.024 169	0.013 288
RCP 3	.030	-0.104	1.102 349	0.041 279	0.018 325	0.019 28	0.013 112	0.034 193	0.031 315	0.003 250	0.005 131
RCP 4	.049	0.178	1.041 349	0.037 279	0.002 138	0.007 3	0.005 127	0.004 *54	0.002 28	0.009 291	0.007 103
RCP 5	.074	0.246	0.992 349	0.030 277	0.001 297	0.002 308	0.002 312	0.01 144	0.003 302	0.003 267	0.013 129
RCP 6	.099	0.401	0.796 350	0.021 286	0.002 149	0.001 147	0.002 143	0.003 359	0.001 340	0.003 263	0.003 100
RCP 7	.149	0.274	0.540 350	0.010 341	0.002 310	0.001 330	0.001 327	0.001 216	0.001 111	0.001 225	0.004 99
RCP 8	.200	0.208	0.450 353	0.008 311	0.001 99	0.003 251	0.003 125	0.002 184	0.003 23	0.002 214	0.004 121
RCP 9	.250	0.193	0.387 351	0.007 336	0.001 244	0.002 300	0.001 159	0.001 43	0.001 257	0.000 190	0.002 141
RCP10	.300	0.184	0.325 351	0.005 340	0.001 76	0.002 266	0.002 116	0.001 272	0.002 184	0.002 102	0.003 146
RCP11	.399	0.174	0.269 355	0.004 338	0.001 60	0.003 310	0.002 184	0.002 171	0.002 232	0.003 145	0.003 167
RCP12	.501	0.174	0.196 357	0.004 343	0.002 301	0.001 297	0.001 278	0.001 1	0.002 *22	0.002 125	.001 150
RCP13	.600	0.191	0.147 358	0.002 3	0. 02 277	0.000 359	0.000 109	0.001 259	0.002 256	0.001 219	0.001 223
RCP14	.701	0.219	0.109 359	0.001 20	0.001 242	0.001 318	0.001 301	0.001 173	0.001 259	0.002 190	0.002 257
RCP15	.800	0.084	0.052 2	0.002 236	0.001 259	0.003 7	0.001 288	0.001 199	0.001 140	0.002 144	0.001 177
RCP16	.900	-0.115	0.008 43	0.006 199	0.003 331	0.002 282	0.000 7	0.002 222	0.002 197	0.001 169	0.001 249
RCP17	.969	-0.056	0.019 180	0.002 313	0.000 290	0.002 9	0.001 91	0.003 115	0.001 286	0.002 138	0.001 75

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.060	0.[illegible]	2.65	0.0	2.45	12127.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	FRT DAMP
196.0 (643.1)	103412. (2159.8)	0.95E 07	-0.018	0.701	5.10	-0.00085	1.[illegible]5	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.440	2.651 0	0.059 5	0.060 215	0.029 127	0.018 79	0.008 18	0. 2 196	0.015 89	0.016 90
CN		0.414	0.280 352	0.004 10	0.003 199	0.002 212	0.001 310	0.000 126	0.002 110	0.002 67	0.001 366
CM		-0.007	0.210 324	0.032 269	0.030 49	0.020 198	0.020 199	0.009 293	0.009 289	0.001 294	0.000 224
DCP 1	.010	0.850	1.646 347	0.065 25	0.014 359	0.012 66	0.003 190	0.005 241	0.006 221	0.012 144	0.007 196
DCP 2	.020	0.891	1.753 349	0.069 42	0.019 330	0.006 195	0.001 51	0.002 245	0.004 261	0.007 165	0.003 208
DCP 3	.030	0.891	1.174 349	0.044 45	0.022 339	0.007 208	0.001 52	0.004 293	0.003 269	0.005 179	0.003 317
DCP 4	.049	1.273	1.133 349	0.017 350	0.034 32	0.016 217	0.003 71	0.006 219	0.001 304	0.005 170	0.002 326
DCP 5	.074	1.336	1.053 349	0.053 264	0.007 343	0.020 219	0.006 114	0.006 351	0.003 [illegible]	0.001 185	0.005 277
DCP 6	.099	1.396	1.015 350	0.136 256	0.039 157	0.026 198	0.012 128	0.004 16	0.005 266	0.004 142	0.002 304
DCP 7	.149	0.775	0.463 351	0.057 52	0.024 310	0.006 162	0.006 319	0.003 237	0.004 114	0.000 22	0.000 272
DCP 8	.200	0.433	0.416 353	0.037 50	0.016 330	0.005 216	0.002 82	0.001 260	0.001 261	0.001 166	0.002 347
DCP 9	.250	0.573	0.361 352	0.019 42	0.004 310	0.003 218	0.001 97	0.002 35	0.001 61	0.003 10	0.001 307
DCP10	.300	0.414	0.305 352	0.016 37	0.003 295	0.003 215	0.001 7	0.002 49	0.001 90	0.003 39	0.002 15
DCP11	.399	0.492	0.244 357	0.010 46	0.002 296	0.001 191	0.000 184	0.002 58	0.002 41	0.004 55	0.001 85
DCP12	.501	0.718	0.183 359	0.009 40	0.002 273	0.000 127	0.001 294	0.002 99	0.[illegible] 89	0.[illegible] 81	0.001 70
DCP13	.60	1.273	0.137 0	0.008 39	0.002 252	0.002 295	0.002 306	0.002 71	0.002 73	0.002 64	0.001 19
DCP14	.701	0.911	0.088 9	0.008 39	0.001 313	0.001 30	0.002 297	0.002 356	0.002 141	0.002 95	0.001 45
DCP15	.800	0.191	0.061 9	0.007 47	0.002 289	0.001 348	0.002 249	0.001 131	0.001 154	0.003 99	0.002 13
DCP16	.900	-0.107	0.009 17	0.003 61	0.002 255	0.000 33	0.002 351	0.002 219	0.006 142	0.003 51	0.002 347
DCP17	.969	-0.271	0.015 177	0.001 4	0.001 155	0.002 37	0.002 280	0.002 99	0.001 198	0.[illegible] 82	0.002 99

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.060	0.692	2.70	0.0	4.90	12127.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	FRT DAMP
195.2 (640.4)	102526. (2141.3)	3.94E 07	-0.010	0.976	7.43	-0.00121	1.083	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.900	2.704 0	0.074 4	0.070 321	0.030 107	0.026 16	0.011 282	0.009 83	0.003 112	0.011 341
CN		0.696	0.270 356	0.020 0	0.007 256	0.006 199	0.004 117	0.001 295	0.001 146	0.001 228	0.002 108
CM		0.006	0.019 333	0.003 240	0.010 99	0.001 283	0.001 143	0.000 231	0.003 196	0.000 164	0.000 128
DCP 1	.010	2.257	1.363 350	0.161 49	0.051 313	0.009 161	0.012 336	0.011 207	0.013 [illegible]	0.017 196	0.016 114
DCP 2	.020	2.190	1.226 351	0.053 0	0.013 292	0.040 236	0.021 142	0.019 225	0.019 118	0.002 239	0.017 101
DCP 3	.030	2.124	1.073 351	0.046 327	0.016 179	0.038 239	0.031 136	0.013 293	0.021 115	0.003 26	0.013 103
DCP 4	.049	2.267	0.910 350	0.073 33	0.067 157	0.002 282	0.032 129	0.004 12	0.008 98	0.010 14	0.001 109
DCP 5	.074	2.261	0.903 350	0.395 44	0.024 179	0.028 44	0.017 129	0.017 14	0.006 61	0.007 348	0.003 56
DCP 6	.099	2.330	1.005 350	0.124 54	0.043 314	0.050 50	0.002 184	0.030 22	0.007 309	0.006 323	0.003 128
DCP 7	.149	1.644	0.995 353	0.161 266	0.157 325	0.219 299	0.059 134	0.056 219	0.016 134.	0.015 182	0.029 109
DCP 8	.200	1.041	0.432 1	0.103 290	0.076 179	0.015 134	0.027 129	0.019 44	0.007 313	0.004 302	0.009 264
DCP 9	.250	0.910	0.339 356	0.052 279	0.064 162	0.033 79	0.015 55	0.016 359	0.004 290	0.006 297	0.009 266
DCP10	.300	0.765	0.227 0	0.021 333	0.049 193	0.046 50	0.025 313	0.007 244	0.003 219	0.002 178	0.001 110
DCP11	.399	0.428	0.165 9	0.039 52	0.009 314	0.032 163	0.001 78	0.003 296	0.003 209	0.001 184	0.003 62
DCP12	.501	0.469	0.130 7	0.027 45	0.006 335	0.003 162	0.001 18	0.001 300	0.001 118	0.001 348	0.001 44
DCP13	.600	0.380	0.091 13	0.025 45	0.007 317	0.004 181	0.001 65	0.001 62	0.001 33	0.002 348	0.001 135
DCP14	.701	0.370	0.063 33	0.023 48	0.007 307	0.005 187	0.002 96	0.001 33	0.001 117	0.001 349	0.002 129
DCP15	.800	0.162	0.025 47	0.013 44	0.006 297	0.005 182	0.001 91	0.001 99	0.000 158	0.001 314	0.001 197
DCP16	.900	-0.096	0.012 41	0.003 347	0.004 285	0.003 166	0.001 193	0.001 163	0.003 233	0.002 315	0.001 272
DCP17	.969	-0.282	0.007 174	0.004 267	0.002 147	0.001 132	0.001 322	0.000 257	0.001 203	0.001 13	0.002 65

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.18	0.061	0.591	2.62	0.0	7.43	12527.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TAU	EXT DAMP
194.7 (638.9)	102478. (2140.3)	0.948 07	0.909	1.069	8.59	-0.00146	2.768	0.1

HARMONIC ANALYSIS

DATA TYPE	X/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		7.425	2.623 0	0.094 28	0.066 219	0.027 92	0.036 95	0.024 341	0.030 209	0.017 179	0.019 42
CN		0.868	0.130 20	0.066 59	0.019 51	0.019 12	0.005 6	0.005 307	0.003 270	0.003 310	0.001 243
CM		0.018	0.015 317	0.005 92	0.001 347	0.001 61	0.001 194	0.001 22	0.000 359	0.000 338	0.000 260
DCP 1	.010	1.285	0.644 354	0.176 47	0.038 110	0.013 182	0.006 315	0.013 102	0.018 270	0.007 234	0.007 241
DCP 2	.025	1.098	0.761 357	0.197 58	0.019 97	0.027 40	0.027 136	0.021 207	0.009 241	0.012 197	0.011 275
DCP 3	.050	2.034	0.736 357	0.177 56	0.021 29	0.026 36	0.029 139	0.019 209	0.007 165	0.013 191	0.008 271
DCP 4	.060	2.068	0.532 358	0.127 69	0.032 356	0.030 0	0.010 144	0.011 7	0.009 147	0.017 193	0.005 120
DCP 5	.076	2.843	0.376 357	0.290 79	0.112 9	0.034 343	0.019 335	0.020 326	0.016 222	0.015 172	0.007 90
DCP 6	.099	2.722	0.091 215	0.292 83	0.081 28	0.049 56	0.054 8	0.035 331	0.013 288	0.011 276	0.009 239
DCP 7	.149	2.064	0.968 14	0.479 64	0.225 144	0.079 56	0.099 127	0.076 27	0.030 135	0.014 153	0.025 286
DCP 8	.200	1.421	0.663 15	0.112 50	0.009 6	0.043 41	0.030 146	0.012 20	0.002 108	0.008 30	0.007 80
DCP 9	.250	1.198	0.339 13	0.062 28	0.077 4	0.053 8	0.043 330	0.021 341	0.017 311	0.011 269	0.006 214
DCP10	.300	0.996	0.250 20	0.036 347	0.068 8	0.041 334	0.040 321	0.029 307	0.021 296	0.016 291	0.012 266
DCP11	.398	0.775	0.122 28	0.019 6	0.013 97	0.020 286	0.009 277	0.012 260	0.006 287	0.005 262	0.008 217
DCP12	.501	0.555	0.071 53	0.025 46	0.008 96	0.009 283	0.002 163	0.003 239	0.004 209	0.003 222	0.005 176
DCP13	.602	0.411	0.046 101	0.020 58	0.009 193	0.002 5	0.002 73	0.001 286	0.004 209	0.005 150	0.004 76
DCP14	.701	0.264	0.020 139	0.024 65	0.012 174	0.005 57	0.003 25	0.002 281	0.002 169	0.004 142	0.004 58
DCP15	.800	0.160	0.045 112	0.012 12	0.008 147	0.001 75	0.001 161	0.002 162	0.003 161	0.005 147	0.004 55
DCP16	.900	-0.002	0.025 44	0.007 316	0.002 349	0.007 216	0.002 130	0.001 138	0.002 92	0.001 197	0.002 291
DCP17	.949	-0.084	0.007 41	0.005 284	0.002 295	0.002 209	0.001 293	0.002 185	0.001 222	0.003 208	0.003 193

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	REL.ALPHA	REL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.060	0.594	2.67	0.0	9.03	12129.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,MAX	AERO DAMP	TAU	EXT DAMP
196.7 (645.4)	103977. (2171.6)	0.958 07	-0.131	1.062	9.11	-0.00119	1.969	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	DES 0	DES 1 PHI	DES 2 PHI	DES 3 PHI	DES 4 PHI	DES 5 PHI	DES 6 PHI	DES 7 PHI	DES 8 PHI	DES 9 PHI
ALPHA		9.034	2.479 0	0.089 38	0.033 237	0.019 121	0.012 11	0.013 194	0.011 147	0.020 169	0.007 44
CN		1.051	0.164 100	0.095 124	0.012 190	0.014 144	0.005 293	0.003 190	0.001 115	0.002 178	0.002 291
CM		0.005	0.010 195	0.008 92	0.002 149	0.000 43	0.001 336	0.000 225	0.001 358	0.001 298	0.001 175
DCP 1	.010	1.457	0.208 11	0.179 88	0.036 178	0.016 330	0.005 206	0.006 194	0.011 301	0.008 320	0.000 68
DCP 2	.020	1.949	0.206 12	0.092 88	0.011 47	0.007 132	0.003 97	0.003 194	0.001 241	0.001 215	0.004 124
DCP 3	.030	1.177	0.139 190	0.245 100	0.052 67	0.021 96	0.016 61	0.008 37	0.007 1	0.017 208	0.019 201
DCP 4	.049	2.071	0.316 177	0.291 93	0.075 198	0.044 120	0.029 201	0.020 181	0.007 146	0.006 91	0.002 266
DCP 5	.074	2.697	0.958 176	0.197 93	0.134 191	0.016 141	0.004 222	0.023 230	0.013 215	0.007 330	0.015 283
DCP 6	.099	2.962	0.427 173	0.315 292	0.096 195	0.046 261	0.020 275	0.022 252	0.027 349	0.012 290	0.029 305
DCP 7	.149	2.083	0.492 147	0.196 247	0.068 330	0.041 64	0.011 79	0.015 87	0.014 100	0.018 336	0.019 226
DCP 8	.200	1.620	0.176 122	0.287 111	0.067 169	0.019 170	0.016 212	0.013 219	0.010 282	0.007 277	0.011 210
DCP 9	.250	1.439	0.119 135	0.098 90	0.065 130	0.020 182	0.012 209	0.006 196	0.006 6	0.006 261	0.006 202
DCP10	.300	1.189	0.128 91	0.091 85	0.037 172	0.001 332	0.013 271	0.014 274	0.011 96	0.016 134	0.007 69
DCP11	.399	0.903	0.161 25	0.220 23	0.019 136	0.012 95	0.008 154	0.012 174	0.009 136	0.010 191	0.006 79
DCP12	.501	0.659	0.133 29	0.021 286	0.035 290	0.004 142	0.006 226	0.003 69	0.005 196	0.008 167	0.001 337
DCP13	.600	0.484	0.106 35	0.096 247	0.013 273	0.007 246	0.016 193	0.001 111	0.007 171	0.006 161	0.006 71
DCP14	.701	0.278	0.067 41	0.069 269	0.016 296	0.006 293	0.001 137	0.002 64	0.006 115	0.009 91	0.005 323
DCP15	.800	0.199	0.082 28	0.030 247	0.005 337	0.004 164	0.005 102	0.002 26	0.004 111	0.002 24	0.010 315
DCP16	.900	-0.024	0.020 11	0.007 279	0.002 142	0.004 58	0.004 139	0.001 138	0.006 93	0.002 338	0.003 336
DCP17	.949	-0.063	0.009 9	0.006 319	0.003 275	0.003 317	0.003 286	0.002 246	0.001 218	0.002 148	0.003 28

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.060	0.593	2.44	0.0	12.49	12131.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAR	EXT DAMP
196.5 (644.7)	103900. (2170.0)	0.958 07	-0.059	1.091	12.79	-0.00162	2.219	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.488	2.437 0	0.065 2	0.026 199	0.019 122	0.016 74	0.019 129	0.026 202	0.021 8	0.008 88
CN		0.972	0.372 82	0.005 133	0.008 68	0.005 206	0.003 222	0.006 63	0.004 235	0.005 31	0.004 243
CM		-0.025	0.034 195	0.004 266	0.001 193	0.000 65	0.001 29	0.002 220	0.001 325	0.002 159	0.001 180
OCP 1	.010	3.739	0.095 161	0.119 106	0.003 295	0.017 303	0.011 193	0.026 110	0.014 0	0.008 33'	0.005 114
OCP 2	.020	3.594	0.122 169	0.113 89	0.007 248	0.022 148	0.019 166	0.029 119	0.012 117	0.012 70	0.004 311
OCP 3	.030	3.196	0.135 174	0.028 136	0.019 174	0.014 279	0.023 167	0.017 145	0.024 81	0.025 74	0.010 44
OCP 4	.049	2.866	0.140 172	0.038 291	0.061 .73	0.009 258	0.008 166	0.001 62	0.012 314	0.017 148	0.011 310
OCP 5	.074	2.431	0.399 161	0.103 271	0.027 94	0.011 292	0.015 189	0.006 124	0.018 286	0.019 115	0.009 312
OCP 6	.099	2.153	0.125 148	0.068 271	0.031 67	0.029 193	0.006 249	0.009 91	0.013 314	0.019 73	0.015 231
OCP 7	.149	1.748	0.198 134	0.039 295	0.029 57	0.029 213	0.007 336	0.006 109	0.021 273	0.012 68	0.017 225
OCP 8	.200	1.503	0.133 140	0.013 218	0.018 102	0.015 186	0.007 205	0.010 74	0.009 298	0.017 60	0.022 244
OCP 9	.250	1.393	0.124 117	0.020 218	0.019 45	0.016 200	0.003 14	0.013 51	0.011 252	0.004 42	0.006 214
OCP10	.300	1.225	0.113 89	0.023 173	0.015 23	0.006 145	0.006 62	0.001 337	0.015 198	0.008 64	0.014 251
OCP11	.349	1.032	0.106 62	0.019 134	0.008 86	0.014 75	0.014 264	0.008 47	0.012 200	0.011 19	0.009 194
OCP12	.501	0.779	0.134 39	0.020 96	0.017 51	0.009 332	0.008 313	0.007 19	0.012 230	0.004 12	0.010 308
OCP13	.600	0.597	0.125 24	0.018 106	0.007 43	0.007 280	0.007 265	0.010 72	0.010 210	0.016 2	0.008 77
OCP14	.751	0.471	0.132 18	0.016 79	0.005 331	0.011 218	0.011 201	0.006 47	0.006 104	0.008 329	0.005 27
OCP15	.800	0.397	0.123 18	0.009 44	0.004 86	0.002 199	0.006 107	0.005 17	0.003 197	0.004 293	0.005 326
OCP16	.900	0.269	0.084 15	0.013 61	0.004 353	0.003 136	0.005 165	0.007 80	0.009 41	0.006 269	0.009 301
OCP17	.969	-0.017	0.039 19	0.008 101	0.001 10	0.005 202	0.007 193	0.007 36	0.007 17	0.005 224	0.004 111

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.060	0.591	2.50	0.0	14.93	12131.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAR	EXT DAMP
195.4 (641.0)	103211. (2155.6)	0.955 07	-0.077	1.078	16.18	-0.00169	2.215	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.928	2.550 0	0.063 23	0.021 260	0.025 103	0.007 61	0.010 199	0.012 319	0.018 2	0.023 347
CN		1.000	0.064 61	0.001 286	0.007 318	0.004 313	0.003 9	0.003 189	0.001 324	0.004 264	0.002 22
CM		-0.054	0.072 204	0.003 266	0.001 305	0.001 297	0.002 180	0.001 260	0.000 199	0.002 82	0.002 123
OCP 1	.010	3.594	0.256 156	0.028 4	0.027 81	0.027 246	0.015 78	0.020 213	0.009 211	0.010 182	0.016 130
OCP 2	.020	3.404	0.296 165	0.021 345	0.024 93	0.031 282	0.009 213	0.019 217	0.017 136	0.008 200	0.006 179
OCP 3	.030	2.960	0.331 174	0.049 29	0.069 11	0.021 222	0.033 224	0.014 293	0.020 150	0.008 71	0.007 221
OCP 4	.049	2.763	0.170 154	0.087 268	0.073 0	0.011 110	0.019 207	0.010 28	0.012 266	0.010 209	0.018 99
OCP 5	.074	2.403	0.096 65	0.035 272	0.054 337	0.006 353	0.036 201	0.012 78	0.010 304	0.007 115	0.020 101
OCP 6	.099	1.998	0.361 83	0.032 253	0.033 292	0.014 298	0.009 175	0.014 147	0.012 351	0.016 257	0.014 111
OCP 7	.149	1.574	0.040 111	0.026 254	0.040 289	0.013 293	0.012 228	0.014 210	0.006 40	0.001 110	0.004 199
OCP 8	.200	1.442	0.052 96	0.029 334	0.027 293	0.015 270	0.008 279	0.017 195	0.008 86	0.009 197	0.015 120
OCP 9	.250	1.345	0.794 89	0.00- 324	0.010 289	0.023 359	0.016 87	0.017 213	0.005 310	0.017 97	0.009 70
OCP10	.300	1.208	0.100 82	0.013 217	0.014 269	0.020 338	0.005 335	0.015 279	0.012 323	0.009 24	0.007 55
OCP11	.349	1.076	0.088 62	0.014 153	0.010 177	0.013 275	0.013 47	0.002 250	0.011 256	0.004 348	0.011 80
OCP12	.501	0.891	0.091 47	0.009 141	0.005 206	0.006 327	0.010 27	0.002 196	0.007 200	0.006 270	0.006 5
OCP13	.600	0.717	0.104 30	0.015 103	0.005 99	0.002 307	0.007 42	0.001 158	0.012 144	0.012 321	0.003 355
OCP14	.701	0.591	0.100 24	0.019 87	0.003 92	0.009 114	0.008 347	0.006 131	0.008 92	0.012 268	0.009 340
OCP15	.800	0.406	0.092 24	0.011 67	0.003 85	0.004 68	0.005 317	0.007 41	0.008 299	0.010 257	0.009 291
OCP16	.900	0.151	0.357 28	0.013 54	0.005 42	0.012 138	0.005 300	0.009 73	0.010 343	0.008 294	0.020 283
OCP17	.969	0.017	0.019 39	0.012 35	0.008 7	0.005 136	0.002 343	0.005 169	0.009 42	0.014 186	0.008 284

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMES HZ	DRIVE HZ	K	MACH NO	REF.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.84	0.119	0.591	2.44	0.0	2.01	12193.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TPO	RET DAMP
196.7 (645.3)	104240. (2177.1)	0.95E 07	-0.039	0.465	2.78	-0.00079	1.112	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.014	2.442 0	0.080 359	0.062 242	0.027 92	0.023 50	0.016 74	0.027 192	0.007 195	0.007 286
CN		0.126	0.276 350	0.005 334	0.002 303	0.003 357	0.001 61	0.001 94	0.002 139	0.001 44	0.001 214
CM		-0.014	0.012 302	0.001 240	0.000 334	0.001 117	0.000 297	0.000 280	0.000 283	0.000 297	0.000 62
RCP 1	.010	-0.091	1.965 339	0.166 78	0.040 81	0.027 25	0.017 65	0.006 130	0.009 87	0.004 334	0.002 292
RCP 2	.020	-0.651	1.317 345	0.047 261	0.028 336	0.008 48	0.015 286	0.005 291	0.007 69	0.001 117	0.001 184
RCP 3	.030	-0.171	1.154 344	0.033 264	0.019 305	0.015 35	0.006 48	0.006 121	0.001 124	0.002 48	0.001 161
RCP 4	.040	0.178	1.010 345	0.034 255	0.006 274	0.010 50	0.003 91	0.002 73	0.003 79	0.001 277	0.001 92
RCP 5	.074	0.344	0.862 344	0.027 258	0.009 292	0.010 60	0.003 293	0.004 99	0.003 165	0.001 79	0.000 158
RCP 6	.059	0.497	0.727 346	0.020 267	0.005 277	0.008 63	0.001 261	0.002 47	0.001 189	0.002 133	0.002 186
RCP 7	.145	0.379	0.619 346	0.009 333	0.008 291	0.006 79	0.000 69	0.003 117	0.001 104	0.000 357	0.001 254
RCP 8	.200	0.211	0.490 351	0.007 313	0.003 306	0.005 123	0.002 95	0.000 166	0.001 177	0.001 15	0.002 187
RCP 9	.250	0.207	0.368 349	0.006 331	0.004 320	0.003 340	0.001 150	0.000 221	0.001 42	0.002 5	0.000 338
RCP10	.300	0.232	0.237 349	0.010 346	0.003 315	0.002 320	0.001 339	0.002 67	0.000 101	0.001 67	0.002 180
RCP11	.395	0.177	0.243 359	0.008 7	0.002 321	0.002 323	0.000 76	0.001 179	0.002 176	0.001 75	0.002 271
RCP12	.501	0.139	0.184 2	0.005 27	0.000 283	0.003 2	0.001 129	0.000 9	0.001 121	0.001 5	0.002 200
RCP13	.600	0.147	0.135 5	0.004 39	0.001 300	0.004 323	0.002 232	0.001 58	0.002 119	0.001 89	0.002 248
RCP14	.701	0.227	0.092 9	0.003 29	0.001 278	0.001 268	0.001 199	0.002 119	0.001 170	0.001 99	0.001 189
RCP15	.800	0.189	0.069 19	0.001 1	0.001 149	0.004 301	0.002 35	0.001 295	0.002 49	0.002 91	0.002 242
RCP16	.900	-0.111	0.014 74	0.001 78	0.000 310	0.003 348	0.002 119	0.002 71	0.001 66	0.002 278	0.001 167
RCP17	.960	-0.055	0.021 179	0.002 296	0.002 272	0.000 302	0.002 304	0.001 290	0.000 217	0.002 119	0.004 344

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TIMES HZ	DRIVE HZ	K	MACH NO	REF.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.82	0.119	0.591	2.44	0.0	2.49	12193.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TPO	RET DAMP
195.6 (641.7)	103541. (2162.5)	0.95E 07	-0.022	0.490	5.41	-0.00079	1.254	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.492	2.956 0	0.076 353	0.060 235	0.051 93	0.031 56	0.012 16	0.016 107	0.002 48	0.004 [illegible]
CN		0.622	0.275 351	0.008 8	0.004 296	0.001 139	0.001 123	0.000 302	0.001 75	0.001 312	0.001 127
CM		-0.018	0.014 307	0.002 219	0.000 29	0.001 138	0.000 8	0.000 65	0.000 314	0.000 243	0.000 271
RCP 1	.010	0.824	1.612 340	0.050 49	0.016 279	0.010 93	0.008 17	0.005 233	0.004 72	0.004 234	0.000 240
RCP 2	.020	0.916	1.306 344	0.036 37	0.021 315	0.008 68	0.001 79	0.004 4	0.002 63	0.001 243	0.001 242
RCP 3	.030	1.023	1.139 343	0.039 38	0.026 339	0.003 91	0.001 72	0.002 10	0.002 34	0.001 237	0.001 50
RCP 4	.049	1.287	1.100 343	0.005 17	0.037 308	0.012 160	0.002 90	0.001 219	0.002 25	0.000 249	0.000 0
RCP 5	.074	1.345	1.072 343	0.055 237	0.019 337	0.013 177	0.000 72	0.010 322	0.001 326	0.000 266	0.002 152
RCP 6	.099	1.318	0.975 344	0.131 240	0.008 129	0.008 61	0.011 97	0.000 358	0.001 302	0.000 260	0.001 50
RCP 7	.149	0.780	0.628 349	0.067 98	0.037 296	0.011 150	0.006 303	0.010 165	0.012 58	0.010 298	0.017 177
RCP 8	.200	0.650	0.398 353	0.034 96	0.016 339	0.008 169	0.002 96	0.002 349	0.001 173	0.003 145	0.001 96
RCP 9	.250	0.482	0.349 359	0.019 19	0.005 337	0.003 121	0.003 102	0.001 17	0.002 349	0.002 358	0.002 148
RCP10	.300	0.431	0.292 351	0.016 11	0.005 294	0.002 150	0.000 126	0.001 21	0.002 276	0.002 303	0.002 112
RCP11	.399	0.433	0.234 0	0.012 22	0.001 334	0.002 70	0.001 158	0.001 39	0.002 287	0.002 118	0.001 85
RCP12	.501	0.325	0.176 3	0.010 23	0.002 257	0.002 276	0.000 127	0.001 6	0.001 99	0.001 85	0.001 87
RCP13	.600	0.267	0.129 9	0.008 30	0.003 295	0.001 120	0.001 149	0.002 319	0.000 166	0.001 40	0.002 57
RCP14	.701	0.320	0.092 14	0.008 23	0.002 339	0.001 324	0.000 135	0.001 270	0.001 101	0.001 43	0.001 52
RCP15	.800	0.134	0.062 30	0.006 46	0.002 330	0.002 264	0.000 221	0.002 191	0.001 61	0.001 234	0.000 130
RCP16	.900	-0.100	0.015 67	0.004 27	0.001 267	0.005 335	0.001 168	0.002 226	0.004 188	0.001 324	0.001 219
RCP17	.960	-0.075	0.016 189	0.002 326	0.001 177	0.002 320	0.000 159	0.001 313	0.002 29	0.001 72	0.002 237

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

SPEECH PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	49.79	0.120	0.589	2.98	0.0	5.00	12133.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TAU	EXT DAMP
194.5 (638.2)	102469 (2139.7)	0.940 07	-0.019	1.081	8.02	-0.00107	1.495	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	AES 0	AES 1 PHI	AES 2 PHI	AES 3 PHI	AES 4 PHI	AES 5 PHI	AES 6 PHI	AES 7 PHI	AES 8 PHI	AES 9 PHI
ALPHA		5.004	2.980 0	0.093 8	0.094 251	0.077 119	0.032 66	0.007 58	0.007 219	0.005 166	0.002 317
CN		0.702	0.266 347	0.020 318	0.007 195	0.008 144	0.004 82	0.001 241	0.002 194	0.002 76	0.002 2
CM		0.005	0.022 315	0.003 195	0.001 359	0.002 269	0.001 93	0.000 135	0.000 17	0.000 231	0.000 186
DCP 1	.010	2.301	1.284 347	0.133 36	0.047 300	0.015 218	0.006 271	0.014 156	0.007 137	0.010 174	0.004 297
DCP 2	.020	2.219	1.222 346	0.123 321	0.016 335	0.008 294	0.020 180	0.018 177	0.020 83	0.021 198	0.014 90
DCP 3	.030	2.158	1.172 345	0.035 272	0.007 149	0.046 202	0.029 97	0.012 179	0.021 60	0.004 289	0.012 29
DCP 4	.040	2.287	0.900 344	0.042 33	0.043 132	0.010 191	0.007 97	0.006 345	0.012 44	0.019 186	0.002 960
DCP 5	.074	2.278	0.905 345	0.066 42	0.018 150	0.020 22	0.017 90	0.010 329	0.007 96	0.011 201	0.009 246
DCP 6	.099	2.247	0.997 348	0.103 50	0.056 300	0.041 45	0.006 350	0.027 349	0.007 204	0.000 325	0.003 224
DCP 7	.149	1.603	0.930 352	0.108 269	0.131 291	0.191 194	0.049 91	0.050 146	0.020 73	0.023 111	0.009 19
DCP 8	.200	1.091	0.466 0	0.124 266	0.085 151	0.010 91	0.029 99	0.022 9	0.012 267	0.006 199	0.005 161
DCP 9	.250	0.992	0.347 345	0.062 248	0.069 126	0.038 30	0.016 356	0.019 293	0.014 196	0.007 122	0.036 72
DCP10	.300	0.782	0.236 1	0.021 274	0.051 114	0.044 9	0.024 259	0.007 197	0.010 145	0.013 70	0.011 333
DCP11	.399	0.634	0.174 15	0.031 26	0.004 271	0.007 107	0.002 277	0.002 219	0.006 116	0.004 99	0.003 308
DCP12	.501	0.478	0.136 20	0.026 18	0.004 242	0.007 125	0.002 218	0.001 84	0.001 61	0.002 345	0.001 294
DCP13	.600	0.394	0.102 33	0.023 16	0.006 294	0.008 121	0.002 318	0.002 65	0.001 142	0.001 73	0.001 76
DCP14	.701	0.278	0.069 55	0.023 12	0.008 249	0.008 126	0.001 51	0.000 283	0.001 157	0.000 169	0.001 80
DCP15	.800	0.163	0.043 69	0.013 355	0.004 211	0.008 111	0.002 14	0.002 256	0.002 199	0.003 6	0.001 94
DCP16	.900	-0.002	0.019 62	0.007 279	0.006 178	0.009 117	0.002 116	0.001 287	0.001 190	0.002 136	0.001 8
DCP17	.969	-0.082	0.008 180	0.007 258	0.000 199	0.007 117	0.002 273	0.001 17	0.001 167	0.001 37	0.002 340

SPEECH PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	49.81	0.120	0.588	2.98	0.0	7.91	12133.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,AMAX	AERO DAMP	TAU	EXT DAMP
193.7 (635.5)	99399. (2077.0)	0.920 07	-0.013	1.152	9.34	-0.00127	1.984	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	AES 0	AES 1 PHI	AES 2 PHI	AES 3 PHI	AES 4 PHI	AES 5 PHI	AES 6 PHI	AES 7 PHI	AES 8 PHI	AES 9 PHI
ALPHA		7.937	2.991 0	0.107 44	0.042 315	0.121 144	0.015 55	0.010 336	0.012 250	0.013 192	0.012 229
CN		0.864	0.178 36	0.003 25	0.032 290	0.008 170	0.003 244	0.003 215	0.008 59	0.003 236	0.006 189
CM		0.012	0.020 278	0.013 105	0.007 6	0.004 290	0.001 76	0.001 272	0.002 126	0.001 41	0.001 357
DCP 1	.010	3.229	0.698 353	0.179 43	0.047 170	0.011 157	0.010 60	0.022 218	0.005 284	0.012 54	0.005 219
DCP 2	.020	3.066	0.822 357	0.170 47	0.014 222	0.031 67	0.035 118	0.007 218	0.010 112	0.011 183	0.009 254
DCP 3	.030	2.889	0.737 359	0.187 42	0.040 339	0.006 101	0.051 110	0.016 8	0.004 124	0.018 158	0.004 959
DCP 4	.049	2.858	0.494 359	0.192 45	0.138 334	0.049 262	0.031 161	0.017 29	0.017 97	0.006 30	0.005 78
DCP 5	.074	2.714	0.161 16	0.349 65	0.227 337	0.005 247	0.015 156	0.019 284	0.024 157	0.018 67	0.008 37
DCP 6	.099	2.656	0.113 119	0.417 63	0.172 329	0.037 226	0.047 340	0.047 263	0.023 169	0.011 259	0.029 145
DCP 7	.149	1.957	0.412 30	0.566 57	0.063 132	0.074 50	0.061 89	0.037 335	0.014 80	0.019 201	0.032 197
DCP 8	.200	1.380	0.404 28	0.177 16	0.130 329	0.012 306	0.018 329	0.014 297	0.017 178	0.016 10	0.007 35
DCP 9	.250	1.199	0.396 22	0.145 356	0.149 301	0.040 224	0.043 286	0.026 215	0.007 246	0.014 112	0.019 73
DCP10	.300	1.011	0.320 29	0.141 338	0.112 298	0.055 291	0.046 249	0.017 198	0.009 191	0.020 295	0.019 155
DCP11	.399	0.787	0.197 42	0.077 335	0.044 241	0.018 169	0.017 232	0.026 164	0.015 88	0.019 21	0.007 284
DCP12	.501	0.574	0.191 54	0.061 339	0.036 225	0.012 138	0.008 179	0.016 195	0.015 2	0.012 269	0.010 179
DCP13	.600	0.441	0.174 74	0.051 342	0.028 213	0.017 115	0.006 110	0.010 40	0.011 295	0.004 193	0.002 184
DCP14	.701	0.376	0.112 102	0.037 345	0.019 179	0.019 80	0.002 270	0.007 39	0.010 284	0.006 196	0.004 181
DCP15	.800	0.169	0.080 96	0.033 324	0.020 168	0.014 90	0.004 352	0.004 315	0.003 272	0.002 260	0.007 186
DCP16	.900	-0.073	0.050 45	0.029 295	0.015 181	0.013 110	0.002 326	0.004 334	0.004 282	0.004 191	0.005 144
DCP17	.969	-0.981	0.017 46	0.014 299	0.005 213	0.008 139	0.002 290	0.000 123	0.003 283	0.004 143	0.003 107

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL MLR 1

TUNNEL MT	0.0	DRIVE MT	45.77	K	0.118	MACH NO	0.594	DEL.ALPHA	2.69
DEL.M	0.0	ALPHA.0	9.96	TEST POINT	12139.1	CYCLES ANALYSED	20		
V	196.9 (646.2)	Q	104318. (2179.2)	DN	0.95E 07	CN(MIN)	-0.046	CN(MAX)	1.193
ALPHA.MAX	9.97	ARDN DAMP	-0.00167	TAB	2.559	EXT PARM	0.0		

HARMONIC ANALYSIS

DATA TYPE	K/C	DEG 0	DEG 1 PHI	DEG 2 PHI	DEG 3 PHI	DEG 4 PHI	DEG 5 PHI	DEG 6 PHI	DEG 7 PHI	DEG 8 PHI	DEG 9 PHI
ALPHA		9.042	2.624 0	0.006 36	0.159 171	0.019 276	0.001 248	0.000 179	0.023 178	0.005 89	0.005 316
CN		0.034	0.199 109	0.035 90	0.025 102	0.003 309	0.004 307	0.004 274	0.005 248	0.003 309	0.002 77
CM		0.009	0.096 214	0.007 196	0.007 184	0.004 107	0.002 126	0.002 57	0.001 81	0.001 339	0.001 209
PCP 1	.010	0.973	0.264 21	0.060 89	0.010 70	0.005 2	0.016 318	0.004 196	0.009 199	0.000 244	0.008 139
PCP 2	.020	0.907	0.220 29	0.123 103	0.059 96	0.038 46	0.029 354	0.011 317	0.002 262	0.011 325	0.012 256
PCP 3	.030	0.190	0.061 117	0.228 99	0.064 89	0.069 101	0.068 93	0.016 0	0.015 82	0.020 19	0.024 306
PCP 4	.040	2.913	0.936 173	0.274 199	0.166 176	0.098 112	0.095 131	0.033 92	0.029 102	0.026 126	0.010 87
PCP 5	.074	2.606	0.651 172	0.231 95	0.169 169	0.074 103	0.044 151	0.020 81	0.018 189	0.007 166	0.008 155
PCP 6	.090	2.474	0.770 167	0.099 87	0.189 166	0.014 165	0.031 170	0.322 276	0.010 100	0.024 278	0.002 177
PCP 7	.145	2.391	0.798 150	0.078 227	0.023 128	0.021 280	0.050 314	0.033 325	0.022 226	0.028 256	0.012 197
PCP 8	.200	1.987	0.331 111	0.138 96	0.090 143	0.027 108	0.010 2	0.011 78	0.015 206	0.006 279	0.008 204
PCP 9	.255	1.389	0.274 89	0.128 72	0.061 139	0.010 82	0.009 179	0.010 327	0.007 324	0.016 303	0.012 144
PCP10	.300	1.151	0.275 67	0.108 88	0.047 115	0.014 109	0.021 176	0.010 108	0.009 338	0.017 326	0.011 65
PCP11	.365	0.871	0.219 57	0.049 77	0.055 64	0.012 345	0.013 83	0.005 260	0.013 287	0.007 252	0.005 25
PCP12	.501	0.663	0.184 59	0.038 17	0.041 47	0.024 323	0.011 349	0.014 277	0.012 224	0.007 307	0.007 164
PCP13	.600	0.488	0.162 64	0.020 285	0.033 49	0.020 309	0.013 324	0.007 187	0.009 299	0.002 92	0.009 287
PCP14	.701	0.381	0.123 74	0.007 264	0.020 259	0.018 282	0.010 268	0.007 241	0.008 274	0.006 149	0.004 68
PCP15	.800	0.206	0.113 49	0.026 279	0.025 244	0.016 265	0.007 314	0.006 283	0.006 284	0.004 195	0.008 26
PCP16	.900	-0.029	0.093 35	0.015 313	0.013 325	0.009 263	0.013 295	0.007 218	0.007 178	0.006 128	0.004 85
PCP17	.965	-0.062	0.046 35	0.005 71	0.013 344	0.009 153	0.006 204	0.009 268	0.005 194	0.004 156	0.004 36

FORCED PITCHING OSCILLATION AIRFOIL MLR 1

TUNNEL MT	0.0	DRIVE MT	45.87	K	0.119	MACH NO	0.591	DEL.ALPHA	2.97
DEL.M	0.0	ALPHA.0	12.51	TEST POINT	12135.9	CYCLES ANALYSED	20		
V	195.7 (642.4)	Q	103643. (2165.1)	DN	0.94E 07	CN(MIN)	-0.075	CN(MAX)	1.118
ALPHA.MAX	11.98	ARDN DAMP	-0.00184	TAB	2.966	EXT PARM	0.0		

HARMONIC ANALYSIS

DATA TYPE	K/C	DEG 0	DEG 1 PHI	DEG 2 PHI	DEG 3 PHI	DEG 4 PHI	DEG 5 PHI	DEG 6 PHI	DEG 7 PHI	DEG 8 PHI	DEG 9 PHI
ALPHA		12.505	2.572 0	0.007 19	0.179 217	0.042 45	0.021 36	0.006 107	0.011 219	0.008 97	0.011 2
CN		0.080	0.140 87	0.017 192	0.007 171	0.005 285	0.003 81	0.003 54	0.011 337	0.004 240	0.001 180
CM		-0.029	0.044 219	0.006 260	0.002 243	0.001 188	0.002 214	0.002 203	0.001 127	0.001 62	0.002 299
PCP 1	.010	3.499	0.131 134	0.005 88	0.036 214	0.006 346	0.010 272	0.012 219	0.009 164	0.008 268	0.008 173
PCP 2	.020	3.391	0.100 145	0.112 89	0.040 224	0.021 185	0.009 259	0.021 193	0.003 51	0.017 231	0.011 226
PCP 3	.030	3.239	0.339 149	0.090 84	0.041 214	0.017 316	0.011 246	0.009 193	0.014 273	0.016 237	0.012 294
PCP 4	.069	2.912	0.439 170	0.089 291	0.081 194	0.058 327	0.006 229	0.007 333	0.010 229	0.017 230	0.009 246
PCP 5	.074	2.635	0.491 159	0.156 269	0.019 70	0.012 293	0.014 58	0.000 5	0.009 3	0.012 138	0.009 317
PCP 6	.090	2.787	0.353 143	0.114 260	0.022 346	0.007 66	0.022 179	0.010 282	0.007 339	0.033 189	0.015 1
PCP 7	.149	1.791	0.228 112	0.099 242	0.021 321	0.043 261	0.002 344	0.010 337	0.018 186	0.005 307	0.008 29
PCP 8	.200	1.606	0.203 139	0.067 206	0.029 219	0.017 267	0.008 342	0.015 143	0.013 283	0.002 52	0.004 336
PCP 9	.250	1.352	0.272 121	0.078 209	0.020 233	0.006 286	0.016 198	0.016 217	0.015 77	0.009 148	0.005 285
PCP10	.300	1.208	0.193 104	0.057 191	0.030 195	0.008 182	0.010 164	0.008 175	0.013 334	0.011 71	0.011 80
PCP11	.349	1.027	0.228 83	0.059 152	0.032 197	0.009 147	0.014 151	0.024 118	0.023 104	0.016 356	0.016 269
PCP12	.501	0.703	0.212 63	0.040 105	0.016 157	0.013 235	0.007 98	0.023 69	0.019 12	0.015 246	0.004 245
PCP13	.600	0.623	0.218 47	0.047 122	0.016 81	0.008 105	0.007 282	0.009 343	0.016 315	0.011 280	0.006 189
PCP14	.701	0.483	0.181 35	0.017 57	0.016 43	0.013 26	0.017 48	0.016 7	0.006 287	0.007 290	0.008 121
PCP15	.800	0.319	0.158 32	0.016 346	0.012 20	0.008 320	0.012 41	0.006 18	0.007 268	0.003 267	0.011 107
PCP16	.900	0.091	0.119 30	0.011 339	0.006 9	0.007 334	0.006 7	0.010 337	0.007 261	0.004 192	0.014 76
PCP17	.969	-0.010	0.060 32	0.013 8	0.005 147	0.010 309	0.003 191	0.004 359	0.013 284	0.011 241	0.006 182

FORCED PITCHING OSCILLATION AIRFOIL . NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.99	0.120	0.589	2.62	0.0	14.95	12135.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
194.7 (638.8)	101832. (2126.8)	0.968 07	-0.981	1.147	15.47	-0.00155	2.644	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.951	2.623 0	0.085 10	0.046 236	0.065 87	0.019 17	0.002 199	0.003 145	0.004 141	0.009 338
CN		1.015	0.131 68	0.012 207	0.006 84	0.008 101	0.004 220	0.004 333	0.004 94	0.003 3	0.003 329
CM		-0.047	0.036 214	0.002 298	0.001 224	0.002 274	0.000 276	0.001 158	0.002 265	0.001 195	0.000 132
DCP 1	.010	2.548	0.331 149	0.043 290	0.076 165	0.019 291	0.005 101	0.021 234	0.011 283	0.005 183	0.014 328
DCP 2	.020	2.460	0.323 163	0.037 246	0.047 193	0.032 279	0.010 67	0.016 269	0.006 159	0.009 260	0.009 66
DCP 3	.030	2.773	0.381 159	0.011 346	0.037 359	0.020 284	0.001 5	0.012 299	0.021 273	0.021 339	0.011 124
DCP 4	.040	2.726	0.224 140	0.078 263	0.079 59	0.043 122	0.013 294	0.030 99	0.018 99	0.010 68	0.013 189
DCP 5	.074	2.395	0.217 98	0.067 260	0.022 25	0.013 56	0.019 229	0.003 252	0.008 345	0.013 112	0.004 267
DCP 6	.099	2.117	0.182 109	0.078 246	0.002 229	0.017 13	0.024 212	0.027 177	0.022 285	0.008 95	0.004 156
DCP 7	.149	1.781	0.138 97	0.037 195	0.019 291	0.004 139	0.013 143	0.020 197	0.004 67	0.009 356	0.011 1
DCP 8	.200	1.566	0.190 97	0.023 158	0.012 255	0.012 171	0.009 320	0.017-242	0.008 298	0.020 99	0.016 2
DCP 9	.250	1.421	0.138 90	0.034 156	0.022 173	0.017 85	0.002 229	0.024 329	0.013 156	0.007 325	0.018 294
DCP10	.300	1.261	0.172 75	0.024 192	0.011 139	0.006 43	0.014 295	0.007 5	0.003 125	0.012 264	0.005 334
DCP11	.399	1.109	0.179 62	0.019 158	0.025 112	0.019 142	0.020 221	0.013 336	0.002 243	0.007 243	0.012 324
DCP12	.501	0.990	0.179 53	0.008 158	0.012 37	0.018 104	0.011 245	0.020 317	0.006 91	0.010 340	0.002 327
DCP13	.600	0.882	0.173 47	0.006 298	0.006 76	0.010 107	0.014 219	0.003 332	0.010 141	0.008 182	0.010 196
DCP14	.701	0.558	0.164 39	0.002 261	0.002 296	0.007 56	0.009 42	0.009 41	0.011 51	0.007 58	0.009 345
DCP15	.801	0.382	0.162 37	0.007 106	0.005 42	0.005 97	0.003 95	0.006 262	0.007 91	0.003 88	0.011 342
DCP16	.900	0.115	0.098 38	0.008 179	0.002 326	0.006 87	0.010 72	0.005 296	0.010 96	0.008 23	0.006 274
DCP17	.969	-0.007	0.044 56	0.007 196	0.002 197	0.013 82	0.005 57	0.004 339	0.009 55	0.010 334	0.002 160

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.62	0.177	0.594	3.16	0.0	-0.32	12137.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TAU	EXT DAMP
197.0 (646.3)	104575. (2184.1)	0.958 07	-0.933	0.396	3.33	-0.00067	1.297	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.025	3.140 0	0.120 335	0.079 203	0.032 153	0.023 42	0.020 70	0.002 297	0.010 237	0.009 189
CN		0.124	0.268 353	0.009 288	0.004 253	0.009 219	0.001 76	0.003 45	0.001 247	0.001 60	0.001 94
CM		-0.016	0.017 293	0.001 290	0.001 80	0.001 97	0.000 290	0.000 274	0.000 141	0.000 129	0.000 267
DCP 1	.010	-0.977	1.000 335	0.137 15	0.047 101	0.013 153	0.010 15	0.005 6	0.006 146	0.009 97	0.013 129
DCP 2	.020	-0.453	1.309 342	0.078 248	0.026 280	0.013 210	0.014 296	0.028 341	0.025 41	0.026 111	0.023 182
DCP 3	.030	-0.176	1.144 341	0.097 247	0.016 270	0.003 146	0.010 44	0.004 99	0.005 203	0.013 144	0.003 259
DCP 4	.049	0.175	1.005 342	0.059 243	0.007 293	0.005 295	0.005 92	0.009 356	0.007 187	0.002 294	0.004 307
DCP 5	.074	0.339	0.854 342	0.046 246	0.017 234	0.006 173	0.002 345	0.004 24	0.002 176	0.004 70	0.003 268
DCP 6	.099	0.491	0.720 344	0.035 251	0.005 220	0.005 201	0.003 23	0.004 357	0.001 191	0.001 127	0.003 273
DCP 7	.149	0.278	0.517 346	0.019 283	0.008 242	0.006 182	0.001 242	0.004 34	0.002 293	0.001 353	0.004 271
DCP 8	.200	0.212	0.425 353	0.017 279	0.003 268	0.007 211	0.001 354	0.005 71	0.005 2	0.003 78	0.003 15
DCP 9	.250	0.202	0.362 359	0.013 281	0.010 259	0.007 204	0.001 88	0.005 24	0.002 99	0.001 111	0.002 102
DCP10	.300	0.197	0.303 352	0.011 294	0.008 237	0.006 196	0.002 139	0.003 3	0.001 271	0.001 147	0.002 36
DCP11	.399	0.177	0.239 5	0.009 322	0.007 286	0.005 214	0.001 104	0.003 47	0.003 349	0.003 20	0.004 92
DCP12	.501	0.171	0.183 10	0.007 353	0.006 308	0.001 270	0.005 110	0.005 86	0.003 337	0.003 115	0.001 257
DCP13	.600	0.144	0.135 18	0.006 358	0.004 214	0.002 237	0.001 140	0.005 68	0.001 329	0.003 265	0.002 122
DCP14	.701	0.223	0.093 24	0.005 349	0.003 271	0.004 263	0.003 79	0.002 91	0.001 96	0.002 335	0.003 64
DCP15	.800	0.085	0.056 42	0.005 10	0.001 179	0.002 255	0.002 93	0.002 96	0.002 241	0.003 289	0.004 88
DCP16	.900	-0.113	0.019 98	0.004 128	0.003 264	0.004 302	0.002 244	0.001 237	0.001 268	0.001 161	0.004 279
DCP17	.969	-0.056	0.023 167	0.002 216	0.003 297	0.001 164	0.003 69	0.002 266	0.002 29	0.002 27	0.005 122

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	NATIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.90	0.179	0.592	3.14	0.0	2.64	12137.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	EXT DAMP
196.2 (643.8)	104073. (2173.6)	0.95E 07	-0.026	0.689	5.80	-0.00072	1.169	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.441	3.139 0	0.098 310	0.116 199	0.039 76	0.006 317	0.010 100	0.003 156	0.006 180	0.008 129
CN		0.420	0.265 353	0.009 324	0.007 246	0.001 166	0.002 144	0.001 347	0.001 41	0.002 316	0.001 79
CM		-0.008	0.020 300	0.003 195	0.001 81	0.000 210	0.000 1	0.000 141	0.000 20	0.000 141	0.000 267
PCP 1	.010	0.775	1.572 335	0.011 198	0.026 147	0.009 251	0.007 36	0.008 256	0.009 152	0.006 17	0.009 239
PCP 2	.020	0.810	1.294 342	0.007 70	0.020 256	0.004 263	0.005 95	0.001 303	0.001 189	0.001 133	0.002 327
PCP 3	.030	1.014	1.121 341	0.014 41	0.020 269	0.007 201	0.004 57	0.000 279	0.002 246	0.002 93	0.003 302
PCP 4	.049	1.241	1.001 341	0.019 203	0.028 279	0.016 181	0.007 44	0.005 197	0.003 341	0.003 218	0.006 331
PCP 5	.074	1.335	1.011 341	0.027 222	0.002 193	0.019 190	0.014 59	0.011 25	0.003 167	0.003 285	0.003 151
PCP 6	.099	1.308	0.966 343	0.150 291	0.048 126	0.006 317	0.013 101	0.010 31	0.002 230	0.002 353	0.009 67
PCP 7	.145	0.983	0.435 349	0.047 24	0.033 279	0.010 162	0.008 212	0.015 109	0.013 73	0.008 260	0.006 131
PCP 8	.200	0.667	0.391 356	0.028 20	0.019 266	0.006 173	0.001 113	0.001 167	0.003 275	0.001 291	0.001 69
PCP 9	.250	0.580	0.342 352	0.017 345	0.011 240	0.003 154	0.002 43	0.001 327	0.001 69	0.000 329	0.003 226
PCP10	.300	0.510	0.286 354	0.014 335	0.009 231	0.002 188	0.002 212	0.000 130	0.001 346	0.003 292	0.002 327
PCP11	.349	0.432	0.227 7	0.012 358	0.006 257	0.002 91	0.002 195	0.001 226	0.002 57	0.002 19	0.004 79
PCP12	.371	0.323	0.172 13	0.012 345	0.006 276	0.001 305	0.004 169	0.003 337	0.001 207	0.003 20	0.003 34
PCP13	.400	0.285	0.129 21	0.012 356	0.008 261	0.002 95	0.003 191	0.001 32	0.002 99	0.003 317	0.001 89
PCP14	.701	0.318	0.096 33	0.014 359	0.008 239	0.002 105	0.001 177	0.003 358	0.001 98	0.001 295	0.001 137
PCP15	.800	0.176	0.069 53	0.010 10	0.004 274	0.002 22	0.002 123	0.002 184	0.001 281	0.002 272	0.003 113
PCP16	.900	-0.102	0.016 88	0.008 353	0.005 234	0.001 54	0.001 124	0.004 265	0.002 277	0.001 346	0.002 27
PCP17	.969	-0.072	0.021 180	0.005 43	0.001 298	0.001 263	0.003 163	0.002 67	0.001 137	0.002 216	0.002 284

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	NATIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.85	0.179	0.591	3.19	0.0	4.94	12137.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	EXT DAMP
195.6 (641.8)	103699. (2165.8)	0.95E 07	-0.029	0.993	9.25	-0.00095	1.559	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.939	3.151 0	0.132 350	0.146 175	0.036 95	0.009 38	0.013 194	0.011 328	0.009 142	0.006 249
CN		0.498	0.267 359	0.020 287	0.014 169	0.003 28	0.003 148	0.002 149	0.001 354	0.001 56	0.003 287
CM		0.005	0.027 309	0.003 164	0.000 79	0.002 179	0.001 33	0.001 293	0.001 126	0.000 311	0.000 70
PCP 1	.010	2.237	1.304 335	0.110 37	0.036 247	0.014 161	0.006 137	0.016 198	0.006 163	0.011 68	0.004 289
PCP 2	.020	2.204	1.227 341	0.088 195	0.032 197	0.045 190	0.027 78	0.021 147	0.003 24	0.003 217	0.015 330
PCP 3	.030	2.167	1.177 341	0.081 218	0.033 147	0.043 186	0.032 73	0.014 141	0.002 93	0.005 236	0.011 332
PCP 4	.049	2.276	0.919 341	0.037 59	0.062 133	0.003 196	0.001 69	0.005 271	0.010 245	0.010 272	0.003 255
PCP 5	.074	2.264	0.914 341	0.060 56	0.037 149	0.026 356	0.017 73	0.019 295	0.007 357	0.007 236	0.005 302
PCP 6	.099	2.232	0.880 343	0.099 53	0.052 258	0.052 38	0.008 301	0.018 294	0.013 124	0.007 297	0.006 147
PCP 7	.149	1.979	0.924 351	0.247 260	0.122 234	0.166 164	0.056 46	0.045 169	0.007 78	0.004 29	0.010 269
PCP 8	.200	1.096	0.482 0	0.135 253	0.104 142	0.027 36	0.000 67	0.011 234	0.009 234	0.012 165	0.010 81
PCP 9	.249	0.928	0.341 346	0.068 222	0.074 103	0.053 348	0.019 246	0.019 194	0.006 124	0.003 121	0.005 31
PCP10	.300	0.774	0.247 4	0.020 324	0.055 87	0.061 319	0.046 195	0.026 86	0.004 322	0.007 210	0.003 76
PCP11	.349	0.635	0.189 23	0.026 91	0.039 242	0.006 307	0.008 181	0.002 93	0.003 278	0.002 8	0.001 299
PCP12	.401	0.476	0.155 39	0.021 358	0.010 241	0.003 21	0.003 189	0.002 331	0.001 323	0.001 197	0.001 288
PCP13	.600	0.392	0.121 62	0.018 351	0.009 224	0.007 37	0.004 237	0.003 329	0.004 311	0.002 169	0.002 321
PCP14	.701	0.374	0.091 64	0.024 346	0.019 211	0.007 46	0.001 152	0.002 6	0.003 329	0.001 125	0.002 227
PCP15	.800	0.169	0.066 73	0.014 319	0.006 192	0.004 33	0.004 219	0.003 58	0.005 355	0.002 162	0.002 186
PCP16	.900	-0.093	0.026 78	0.010 279	0.003 159	0.006 347	0.005 149	0.001 344	0.003 333	0.003 41	0.006 278
PCP17	.949	-0.083	0.008 193	0.004 227	0.002 44	0.001 291	0.002 345	0.002 69	0.002 159	0.001 125	0.002 292

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.96	0.180	0.598	3.04	0.0	7.46	12137.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,AMAX	AERO DAMP	TAU	EXT DAMP
195.0 (639.7)	103321. (2157.9)	0.95E 07	-0.019	1.228	10.23	-0.00087	1.388	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.457	3.036	0	0.332	27	0.178	166	0.046	136	0.013	251	0.013	27	0.008	196	0.006	286	0.013	244
CN		0.844	0.277	36	0.085	324	0.029	211	0.003	142	0.003	119	0.003	96	0.002	184	0.004	46	0.003	261
CM		0.009	0.029	297	0.021	76	0.011	309	0.003	183	0.001	207	0.001	90	0.001	329	0.001	184	0.001	48
PCP 1	.010	3.020	0.777	349	0.157	51	0.035	167	0.006	142	0.009	121	0.008	281	0.010	92	0.004	219	0.011	163
PCP 2	.020	2.971	0.937	348	0.099	99	0.032	320	0.033	79	0.010	118	0.023	40	0.017	129	0.005	261	0.010	132
PCP 3	.030	2.817	0.856	357	0.092	46	0.078	308	0.014	129	0.027	71	0.034	5	0.019	162	0.004	73	0.010	115
PCP 4	.049	2.775	0.913	4	0.177	40	0.154	305	0.075	209	0.014	103	0.028	46	0.019	11	0.018	321	0.008	180
PCP 5	.074	2.639	0.312	33	0.339	33	0.209	283	0.089	173	0.030	306	0.093	144	0.034	27	0.021	299	0.001	179
PCP 6	.099	2.543	0.907	72	0.438	33	0.160	269	0.025	178	0.075	280	0.049	147	0.009	0	0.024	125	0.029	352
PCP 7	.149	1.797	0.780	40	0.378	32	0.042	31	0.090	25	0.015	147	0.026	226	0.016	249	0.029	95	0.028	73
PCP 8	.200	1.361	0.604	31	0.216	325	0.068	290	0.036	291	0.017	220	0.002	319	0.018	227	0.002	286	0.023	255
PCP 9	.250	1.188	0.518	22	0.227	297	0.106	243	0.063	216	0.034	170	0.019	107	0.011	185	0.017	57	0.014	273
PCP10	.300	1.021	0.431	22	0.209	288	0.113	220	0.068	184	0.043	137	0.037	90	0.015	58	0.016	23	0.011	317
PCP11	.399	0.790	0.306	39	0.149	288	0.094	187	0.031	113	0.027	89	0.028	24	0.018	296	0.011	195	0.007	137
PCP12	.501	0.576	0.240	46	0.101	280	0.060	161	0.018	54	0.014	47	0.015	321	0.012	287	0.009	74	0.010	287
PCP13	.600	0.440	0.203	62	0.083	287	0.051	150	0.020	16	0.006	11	0.009	301	0.011	105	0.007	58	0.006	254
PCP14	.701	0.378	0.167	79	0.060	284	0.040	117	0.022	343	0.004	307	0.008	230	0.011	113	0.010	345	0.009	223
PCP15	.800	0.172	0.117	67	0.054	265	0.030	105	0.011	337	0.010	338	0.012	209	0.009	85	0.009	327	0.003	224
PCP16	.900	-0.073	0.070	30	0.042	262	0.021	85	0.003	334	0.005	282	0.003	121	0.001	171	0.002	142	0.005	179
PCP17	.965	-0.085	0.025	36	0.028	256	0.011	99	0.001	199	0.003	20	0.004	180	0.004	120	0.004	13	0.007	228

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.67	0.177	0.592	2.91	0.0	9.94	12139.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA,AMAX	AERO DAMP	TAU	EXT DAMP
196.9 (646.0)	104379. (2180.0)	0.95E 07	-0.079	1.277	11.56	-0.00138	2.236	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.942	2.907	0	0.233	63	0.059	298	0.017	175	0.012	40	0.016	293	0.014	204	0.014	171	0.008	308
CN		0.941	0.258	75	0.062	37	0.027	42	0.009	304	0.007	177	0.003	190	0.005	149	0.004	146	0.004	71
CM		0.000	0.050	219	0.016	111	0.009	131	0.007	76	0.004	16	0.001	4	0.000	343	0.001	334	0.001	216
PCP 1	.010	3.428	0.245	27	0.139	58	0.042	355	0.026	324	0.009	332	0.017	234	0.004	342	0.017	189	0.002	174
PCP 2	.020	3.407	0.299	29	0.175	75	0.065	20	0.017	339	0.019	332	0.020	245	0.009	154	0.005	282	0.006	297
PCP 3	.030	3.151	0.175	52	0.271	78	0.098	4	0.007	131	0.041	29	0.034	311	0.021	244	0.006	159	0.011	279
PCP 4	.049	2.875	0.269	146	0.318	80	0.032	121	0.109	88	0.045	97	0.030	48	0.017	351	0.021	97	0.025	332
PCP 5	.074	2.648	0.524	149	0.335	67	0.131	145	0.120	61	0.008	157	0.047	62	0.006	268	0.033	61	0.016	338
PCP 6	.099	2.518	0.712	147	0.241	95	0.180	142	0.055	57	0.060	178	0.026	67	0.009	121	0.016	16	0.019	134
PCP 7	.149	2.176	0.778	129	0.009	105	0.142	99	0.037	181	0.012	154	0.027	192	0.017	189	0.021	187	0.014	172
PCP 8	.200	1.955	0.580	82	0.193	80	0.114	91	0.007	311	0.009	197	0.031	226	0.029	114	0.018	349	0.008	279
PCP 9	.250	1.350	0.448	60	0.189	50	0.087	54	0.010	42	0.008	38	0.008	225	0.013	137	0.002	189	0.015	132
PCP10	.300	1.131	0.466	50	0.159	48	0.096	41	0.022	27	0.026	101	0.018	158	0.009	159	0.030	165	0.024	109
PCP11	.399	0.888	0.369	56	0.092	7	0.083	14	0.049	335	0.019	325	0.011	12	0.007	356	0.009	313	0.011	66
PCP12	.501	0.667	0.301	54	0.060	322	0.043	352	0.033	309	0.022	274	0.014	332	0.016	246	0.012	172	0.011	351
PCP13	.600	0.598	0.262	60	0.063	310	0.037	332	0.040	269	0.020	234	0.017	228	0.011	125	0.009	227	0.009	112
PCP14	.701	0.411	0.203	65	0.054	285	0.028	298	0.029	244	0.023	197	0.014	189	0.011	157	0.010	135	0.009	35
PCP15	.800	0.221	0.182	50	0.054	290	0.029	285	0.028	227	0.021	145	0.004	44	0.006	117	0.005	137	0.005	22
PCP16	.900	-0.018	0.133	28	0.040	299	0.028	281	0.016	209	0.010	162	0.010	124	0.007	6	0.004	150	0.008	269
PCP17	.965	-0.066	0.060	38	0.021	358	0.022	301	0.011	243	0.009	190	0.007	44	0.004	242	0.006	52	0.006	69

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.84	0.179	0.589	2.88	0.0	12.90	12139.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
195.4 (641.0)	103364. (2158.8)	0.95E 07	-0.095	1.266	12.56	-0.00155	2.479	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.904	2.875	0	0.023	336	0.016	140	0.049	86	0.019	353	0.010	141	0.011	144	0.010	155	0.007	318
CN		0.098	0.221	78	0.027	109	0.015	86	0.007	112	0.001	184	0.006	137	0.002	355	0.002	280	0.002	102
CM		-0.020	0.048	215	0.008	220	0.007	190	0.002	260	0.001	311	0.003	266	0.001	98	0.001	306	0.002	302
OCP 1	.010	3.502	0.098	124	0.001	55	0.030	167	0.010	58	0.015	163	0.007	266	0.011	197	0.003	82	0.004	43
OCP 2	.020	3.534	0.166	123	0.170	85	0.026	172	0.045	107	0.008	58	0.015	145	0.003	69	0.003	77	0.009	94
OCP 3	.030	3.262	0.311	151	0.198	79	0.067	175	0.042	69	0.021	221	0.021	135	0.002	41	0.004	46	0.011	292
OCP 4	.049	2.993	0.471	154	0.034	15	0.118	170	0.038	294	0.041	198	0.039	317	0.016	189	0.021	338	0.011	359
OCP 5	.074	2.649	0.550	148	0.092	265	0.073	118	0.056	264	0.005	47	0.026	296	0.021	57	0.014	294	0.014	354
OCP 6	.099	2.414	0.490	134	0.170	249	0.026	72	0.008	206	0.019	316	0.008	356	0.026	116	0.004	200	0.008	300
OCP 7	.149	1.780	0.328	94	0.095	192	0.033	96	0.018	232	0.018	344	0.029	223	0.015	11	0.012	247	0.006	309
OCP 8	.200	1.411	0.260	108	0.058	166	0.028	209	0.025	155	0.015	197	0.006	292	0.018	170	0.019	7	0.018	270
OCP 9	.250	1.303	0.215	104	0.069	158	0.011	180	0.033	166	0.012	141	0.021	223	0.013	39	0.016	313	0.005	159
OCP10	.300	1.238	0.315	99	0.089	145	0.036	154	0.009	110	0.006	295	0.033	125	0.021	9	0.017	315	0.018	136
OCP11	.399	1.055	0.152	74	0.090	110	0.050	126	0.022	121	0.026	62	0.025	201	0.025	277	0.014	229	0.012	65
OCP12	.501	0.899	0.304	57	0.055	88	0.047	68	0.017	99	0.031	319	0.032	131	0.004	123	0.003	29	0.010	264
OCP13	.600	0.621	0.276	49	0.050	61	0.036	32	0.016	42	0.023	232	0.027	139	0.003	224	0.008	214	0.013	65
OCP14	.701	0.497	0.253	39	0.027	42	0.034	11	0.013	145	0.026	142	0.020	46	0.009	206	0.010	164	0.010	113
OCP15	.800	0.399	0.217	36	0.014	18	0.027	345	0.007	38	0.004	163	0.008	71	0.005	139	0.011	151	0.014	159
OCP16	.900	0.084	0.158	31	0.024	17	0.026	347	0.011	339	0.014	73	0.015	25	0.002	355	0.005	69	0.008	111
OCP17	.969	-0.009	0.075	46	0.028	17	0.014	347	0.015	240	0.009	174	0.013	36	0.015	333	0.021	56	0.017	149

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.92	0.180	0.587	2.91	0.0	14.96	12139.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TOR	EXT DAMP
194.5 (638.2)	102823. (2147.5)	0.95E 07	-0.102	1.191	14.18	-0.00141	2.247	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.962	2.907	0	0.005	290	0.007	165	0.033	102	0.026	1	0.015	219	0.009	184	0.015	184	0.011	341
CN		1.079	0.182	68	0.022	121	0.021	209	0.007	108	0.003	196	0.002	161	0.001	180	0.001	259	0.007	359
CM		-0.048	0.050	217	0.010	236	0.007	359	0.003	317	0.002	4	0.001	13	0.001	67	0.001	123	0.003	166
OCP 1	.010	3.489	0.298	152	0.050	209	0.071	149	0.021	304	0.026	339	0.019	222	0.010	231	0.016	198	0.007	137
OCP 2	.020	3.474	0.354	152	0.037	240	0.067	191	0.026	259	0.020	18	0.007	278	0.025	320	0.014	164	0.017	159
OCP 3	.030	2.904	0.490	156	0.041	270	0.031	321	0.018	49	0.021	321	0.034	114	0.019	258	0.019	194	0.030	169
OCP 4	.049	2.754	0.310	143	0.128	296	0.065	13	0.033	106	0.033	335	0.016	95	0.032	145	0.010	209	0.014	272
OCP 5	.074	2.406	0.225	110	0.105	226	0.056	340	0.036	78	0.012	357	0.010	353	0.018	72	0.019	196	0.013	285
OCP 6	.099	2.081	0.207	116	0.083	191	0.028	339	0.024	83	0.015	297	0.010	257	0.016	126	0.026	170	0.011	339
OCP 7	.149	1.725	0.148	98	0.082	164	0.042	282	0.004	93	0.030	116	0.006	41	0.029	84	0.010	0	0.010	308
OCP 8	.200	1.516	0.203	96	0.066	186	0.031	235	0.039	352	0.017	13	0.018	188	0.014	84	0.033	213	0.019	13
OCP 9	.250	1.410	0.239	96	0.066	148	0.025	241	0.010	342	0.017	72	0.013	139	0.012	106	0.016	135	0.008	115
OCP10	.300	1.255	0.243	75	0.039	115	0.051	222	0.011	291	0.024	288	0.001	322	0.013	319	0.005	49	0.006	282
OCP11	.399	1.091	0.268	66	0.063	111	0.042	216	0.006	257	0.013	291	0.008	338	0.015	272	0.017	22	0.017	83
OCP12	.501	0.870	0.242	52	0.053	88	0.042	186	0.025	140	0.023	159	0.014	73	0.013	202	0.014	4	0.014	56
OCP13	.600	0.685	0.235	43	0.042	75	0.034	107	0.021	150	0.014	161	0.003	94	0.005	51	0.026	302	0.033	7
OCP14	.701	0.564	0.220	40	0.035	46	0.022	176	0.017	97	0.007	158	0.005	223	0.001	223	0.015	236	0.010	321
OCP15	.800	0.391	0.205	39	0.030	49	0.025	175	0.012	104	0.009	196	0.015	206	0.011	247	0.010	194	0.013	314
OCP16	.900	0.122	0.145	41	0.029	16	0.016	151	0.010	151	0.005	295	0.006	235	0.004	207	0.011	105	0.007	279
OCP17	.969	-0.003	0.069	52	0.010	77	0.009	199	0.002	289	0.003	325	0.010	149	0.002	81	0.005	300	0.008	329

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.052	0.686	2.66	0.0	-0.02	12141.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	FRT DAMP
225.2 (738.7)	129133. (2697.0)	0.10E 08	-0.039	0.480	2.68	-0.00180	1.784	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.018	2.658	0	0.061	10	0.056	201	0.030	123	0.027	26	0.009	72	0.019	186	0.020	194	0.015	349
CN		0.140	0.339	351	0.009	296	0.009	136	0.002	24	0.001	295	0.002	222	0.001	225	0.001	196	0.001	256
CM		-0.010	0.013	329	0.001	352	0.001	144	0.000	220	0.000	53	0.000	79	0.000	134	0.001	40	0.000	141
PCP 1	.010	-1.215	1.748	346	0.991	25	0.199	312	0.067	13	0.009	105	0.092	14	0.026	88	0.011	110	0.019	91
PCP 2	.020	-0.749	1.606	347	0.143	52	0.021	348	0.047	32	0.050	107	0.022	176	0.015	105	0.029	148	0.015	279
PCP 3	.030	-0.456	1.461	347	0.214	56	0.069	127	0.003	108	0.052	112	0.033	185	0.020	255	0.019	149	0.036	237
PCP 4	.049	0.028	1.252	347	0.184	58	0.139	131	0.130	209	0.071	282	0.023	353	0.022	251	0.050	334	0.058	42
PCP 5	.074	0.385	0.882	348	0.039	248	0.064	319	0.010	13	0.008	311	0.004	345	0.010	72	0.017	138	0.018	217
PCP 6	.099	0.534	0.900	348	0.056	247	0.062	321	0.010	246	0.010	91	0.015	148	0.007	111	0.005	124	0.037	65
PCP 7	.149	0.451	0.940	348	0.145	245	0.094	133	0.015	264	0.055	117	0.044	7	0.015	222	0.026	5	0.032	241
PCP 8	.200	0.295	0.615	351	0.118	290	0.108	144	0.105	40	0.080	298	0.049	191	0.009	86	0.023	161	0.032	68
PCP 9	.250	0.204	0.381	352	0.046	49	0.032	309	0.013	203	0.004	72	0.002	184	0.001	68	0.002	241	0.002	2
PCP10	.300	0.211	0.337	351	0.025	45	0.017	305	0.006	209	0.003	75	0.002	224	0.001	241	0.001	191	0.002	345
PCP11	.349	0.192	0.280	355	0.011	48	0.005	310	0.003	227	0.002	105	0.002	193	0.001	317	0.004	224	0.002	352
PCP12	.501	0.147	0.210	356	0.006	46	0.004	315	0.002	242	0.001	24	0.002	252	0.000	165	0.001	194	0.001	330
PCP13	.600	0.162	0.149	358	0.003	51	0.003	345	0.001	342	0.000	131	0.001	220	0.001	298	0.003	203	0.002	6
PCP14	.701	0.252	0.094	0	0.004	67	0.002	338	0.001	26	0.002	218	0.001	207	0.002	272	0.002	217	0.002	323
PCP15	.800	0.088	0.339	9	0.001	161	0.701	349	0.002	34	0.002	226	0.002	276	0.002	300	0.004	235	0.001	302
PCP16	.900	-0.127	0.010	147	0.007	234	0.002	34	0.002	40	0.002	221	0.003	296	0.002	296	0.005	207	0.002	327
PCP17	.969	-0.057	0.029	176	0.005	212	0.001	62	0.001	29	0.002	240	0.001	215	0.001	352	0.002	246	0.002	293

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.053	0.684	2.66	0.0	2.43	12141.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.RMAX	AERO DAMP	TAU	FRT DAMP
224.3 (735.8)	128659. (2687.1)	0.10E 08	-0.019	0.842	5.22	-0.00124	2.208	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.431	2.457	0	0.074	22	0.061	231	0.039	111	0.026	48	0.009	94	0.027	206	0.014	162	0.010	344
CN		0.477	0.336	352	0.020	335	0.014	232	0.010	119	0.004	3	0.001	267	0.001	276	0.001	224	0.001	18
CM		-0.006	0.013	320	0.002	149	0.002	39	0.001	303	0.000	216	0.000	28	0.000	62	0.000	320	0.000	68
PCP 1	.010	0.494	1.289	345	0.116	36	0.061	178	0.010	293	0.006	279	0.000	18	0.005	311	0.007	275	0.004	191
PCP 2	.020	0.618	1.080	348	0.105	45	0.019	170	0.006	22	0.004	169	0.002	89	0.003	179	0.008	308	0.001	13
PCP 3	.030	0.739	0.905	348	0.100	48	0.014	172	0.008	21	0.003	161	0.002	93	0.002	141	0.006	308	0.001	322
PCP 4	.049	1.059	0.620	348	0.105	50	0.011	187	0.010	24	0.004	135	0.001	76	0.003	114	0.006	299	0.002	18
PCP 5	.074	1.205	0.741	348	0.082	46	0.013	166	0.006	226	0.004	279	0.003	162	0.004	217	0.005	301	0.001	281
PCP 6	.099	1.341	0.750	348	0.109	51	0.028	156	0.005	5	0.012	113	0.010	178	0.002	243	0.002	260	0.005	228
PCP 7	.149	1.229	0.871	347	0.120	56	0.061	300	0.078	33	0.014	163	0.045	334	0.037	83	0.013	283	0.030	34
PCP 8	.200	1.089	0.926	349	0.015	38	0.140	316	0.015	82	0.089	288	0.023	27	0.048	247	0.033	344	0.038	229
PCP 9	.250	0.971	0.997	348	0.166	242	0.098	318	0.131	208	0.019	310	0.092	178	0.018	62	0.055	148	0.031	40
PCP10	.300	0.711	0.609	356	0.231	271	0.124	189	0.091	152	0.082	72	0.025	332	0.011	35	0.008	280	0.005	338
PCP11	.349	0.459	0.277	1	0.069	273	0.089	143	0.051	49	0.009	3	0.018	13	0.016	277	0.008	206	0.002	162
PCP12	.501	0.304	0.123	9	0.038	41	0.010	163	0.019	42	0.015	296	0.008	193	0.004	119	0.002	350	0.001	199
PCP13	.600	0.268	0.081	16	0.045	51	0.014	305	0.003	211	0.003	187	0.001	162	0.001	203	0.001	51	0.000	8
PCP14	.701	0.317	0.048	25	0.032	48	0.013	296	0.005	187	0.002	96	0.001	324	0.002	224	0.000	92	0.000	96
PCP15	.800	0.120	0.031	23	0.011	38	0.008	278	0.005	149	0.001	355	0.001	225	0.001	169	0.001	194	0.001	320
PCP16	.900	-0.125	0.010	19	0.004	342	0.008	269	0.003	152	0.001	190	0.001	219	0.001	260	0.002	129	0.002	226
PCP17	.969	-0.078	0.013	188	0.002	299	0.005	281	0.003	154	-.002	344	0.002	140	0.001	161	0.001	84	0.001	355

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.059	0.684	2.68	0.0	4.96	12141.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
223.7 (733.9)	128338. (2680.4)	0.10E 08	-0.024	0.981	6.67	-0.00202	3.604	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.963	2.599	0	0.072	39	0.064	206	0.057	97	0.054	29	0.035	279	0.041	177	0.030	148	0.020	78
CN		0.727	0.204	11	0.066	38	0.021	39	0.014	331	0.007	279	0.001	258	0.004	221	0.004	138	0.006	92
CM		0.002	0.014	286	0.005	172	0.003	197	0.003	112	0.003	36	0.002	321	0.001	312	0.002	274	0.001	222
DCP 1	.010	1.541	0.824	336	0.128	23	0.031	25	0.011	236	0.009	180	0.011	284	0.008	264	0.004	13	0.010	345
DCP 2	.020	1.509	0.722	358	0.087	6	0.002	262	0.016	248	0.017	164	0.005	351	0.004	240	0.007	99	0.007	8
DCP 3	.030	1.492	0.610	358	0.076	353	0.011	208	0.018	233	0.018	161	0.005	19	0.002	236	0.006	89	0.008	18
DCP 4	.049	1.499	0.448	358	0.069	20	0.005	174	0.008	199	0.020	131	0.006	240	0.002	306	0.001	47	0.005	6
DCP 5	.074	1.781	0.431	358	0.069	28	0.005	194	0.008	212	0.005	134	0.006	331	0.002	328	0.001	3	0.004	13
DCP 6	.099	1.905	0.396	358	0.067	36	0.009	98	0.005	295	0.004	127	0.006	338	0.002	279	0.000	30	0.003	19
DCP 7	.149	1.880	0.346	357	0.062	34	0.012	24	0.006	267	0.004	193	0.005	319	0.001	240	0.000	48	0.002	7
DCP 8	.200	1.808	0.363	359	0.079	47	0.022	60	0.013	273	0.010	256	0.006	296	0.003	199	0.004	99	0.004	32
DCP 9	.250	1.455	0.328	352	0.454	60	0.147	115	0.020	193	0.080	206	0.037	215	0.065	250	0.025	227	0.029	61
DCP10	.300	1.037	0.467	15	0.260	61	0.134	61	0.128	31	0.080	48	0.031	4	0.017	351	0.006	207	0.008	199
DCP11	.349	0.721	0.358	11	0.017	356	0.089	359	0.046	7	0.041	322	0.020	347	0.008	295	0.005	123	0.014	46
DCP12	.501	0.483	0.210	27	0.063	316	0.044	352	0.052	295	0.035	284	0.022	252	0.021	224	0.017	182	0.007	112
DCP13	.600	0.348	0.195	57	0.046	343	0.020	293	0.031	265	0.027	216	0.018	196	0.022	186	0.019	124	0.016	91
DCP14	.701	0.319	0.073	128	0.028	30	0.007	214	0.011	249	0.021	187	0.018	120	0.012	96	0.013	62	0.011	17
DCP15	.800	0.1..	0.044	114	0.025	25	0.003	260	0.004	244	0.010	140	0.010	119	0.008	88	0.007	43	0.006	337
DCP16	.900	-0.118	0.026	70	0.022	348	0.009	287	0.010	248	0.013	176	0.010	116	0.007	72	0.006	91	0.009	298
DCP17	.969	-0.091	0.015	139	0.010	357	0.003	129	0.004	296	0.002	143	0.002	39	0.002	187	0.004	114	0.002	271

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.45	0.051	0.686	2.47	0.0	7.42	12143.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
225.3 (739.3)	129267. (2699.8)	0.10E 08	-0.017	1.009	9.64	-0.00185	3.318	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.423	2.675	0	0.096	28	0.041	220	0.018	83	0.017	328	0.007	181	0.014	318	0.021	278	0.014	344
CN		0.882	0.117	31	0.022	136	0.007	273	0.010	219	0.007	139	0.002	55	0.003	342	0.005	334	0.004	294
CM		-0.001	0.013	236	0.003	24	0.001	33	0.002	329	0.002	331	0.001	272	0.000	168	0.001	118	0.001	138
DCP 1	.010	2.147	0.576	358	0.078	84	0.000	27	0.009	188	0.019	0	0.004	74	0.010	251	0.007	48	0.005	324
DCP 2	.020	2.084	0.577	2	0.040	76	0.010	16	0.013	115	0.011	22	0.005	79	0.004	312	0.004	73	0.003	61
DCP 3	.030	2.000	0.541	2	0.025	71	0.024	8	0.011	116	0.013	13	0.006	71	0.006	322	0.004	105	0.003	48
DCP 4	.049	2.095	0.400	3	0.007	24	0.010	12	0.004	202	0.010	6	0.002	8	0.006	334	0.006	97	0.004	30
DCP 5	.074	2.134	0.346	3	0.007	23	0.002	28	0.004	194	0.007	19	0.001	326	0.005	333	0.002	86	0.002	7
DCP 6	.099	2.223	0.292	4	0.011	46	0.001	240	0.009	223	0.008	61	0.003	332	0.004	311	0.002	95	0.002	18
DCP 7	.149	2.129	0.197	8	0.004	72	0.031	331	0.028	227	0.016	126	0.007	34	0.004	314	0.003	10	0.004	283
DCP 8	.200	1.985	0.073	46	0.147	79	0.066	348	0.041	243	0.022	131	0.010	34	0.002	299	0.006	68	0.007	352
DCP 9	.250	1.632	0.203	140	0.040	200	0.006	113	0.049	225	0.010	110	0.028	136	0.012	258	0.009	91	0.006	110
DCP10	.300	1.349	0.169	109	0.154	208	0.097	272	0.043	211	0.003	290	0.029	319	0.020	10	0.023	54	0.013	36
DCP11	.399	0.972	0.117	33	0.050	196	0.031	217	0.025	237	0.011	173	0.001	259	0.007	132	0.011	277	0.007	67
DCP12	.501	0.635	0.201	29	0.077	102	0.035	186	0.022	187	0.016	170	0.004	83	0.010	33	0.015	304	0.010	12
DCP13	.600	0.430	0.196	27	0.021	122	0.012	126	0.026	155	0.017	154	0.001	108	0.009	311	0.010	290	0.012	312
DCP14	.701	0.321	0.046	44	0.036	256	0.010	10	0.013	81	0.002	143	0.009	95	0.006	289	0.005	246	0.002	290
DCP15	.800	0.141	0.053	33	0.031	247	0.008	35	0.003	79	0.007	89	0.003	42	0.002	33	0.006	323	0.004	269
DCP16	.900	-0.094	0.053	25	0.004	228	0.009	350	0.004	164	0.005	127	0.002	117	0.002	196	0.001	338	0.005	306
DCP17	.969	-0.092	0.013	49	0.002	225	0.008	308	0.003	95	0.004	174	0.000	225	0.003	172	0.001	326	0.002	320

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL MLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.64	0.051	0.609	2.47	0.0	9.96	12149.2	20

V	Q	PN	CN(MIN)	CN(MAX)	ALPHA.MMAX	ASPD RAMP	TRP	PIT RAMP
224.5 (736.6)	128774. (2689.5)	0.10P 00	-0.048	1.041	11.09	-0.00004	1.075	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.956	2.470 0	0.086 31	0.027 230	0.029 97	0.018 64	0.013 186	0.017 321	0.011 291	0.010 282
CN		0.949	0.980 45	0.016 79	0.011 123	0.001 52	0.009 279	0.001 299	0.001 90	0.009 277	0.007 221
CM		-0.018	0.027 192	0.003 49	0.001 70	0.000 113	0.001 32	0.000 294	0.001 322	0.001 180	0.002 25
PCP 1	.010	2.641	0.356 0	0.041 85	0.007 122	0.009 318	0.006 288	0.003 51	0.001 17	0.006 302	0.003 124
PCP 2	.020	2.598	0.423 1	0.048 65	0.010 125	0.004 133	0.005 248	0.000 337	0.003 30	0.002 18	0.003 250
PCP 3	.030	2.606	0.372 0	0.070 73	0.010 98	0.004 161	0.005 302	0.004 287	0.002 344	0.003 187	0.005 179
PCP 4	.049	2.394	0.305 3	0.068 65	0.014 159	0.007 247	0.005 237	0.002 278	0.000 98	0.002 115	0.003 187
PCP 5	.074	2.319	0.152 15	0.119 69	0.028 11	0.014 18	0.013 300	0.007 297	0.000 265	0.000 184	0.006 127
PCP 6	.099	2.252	0.097 122	0.160 69	0.021 79	0.041 48	0.019 339	0.011 353	0.010 315	0.013 249	0.006 180
PCP 7	.149	2.065	0.794 148	0.087 60	0.077 134	0.034 57	0.016 86	0.014 40	0.016 347	0.011 259	0.001 178
PCP 8	.200	1.835	0.319 194	0.005 289	0.077 134	0.017 237	0.009 192	0.013 227	0.013 207	0.024 216	0.035 18
PCP 9	.250	1.471	0.100 128	0.028 247	0.028 282	0.019 208	0.026 304	0.014 294	0.000 66	0.007 230	0.015 269
PCP10	.300	1.269	0.077 96	0.025 36	0.012 147	0.007 268	0.010 321	0.007 240	0.004 57	0.000 262	0.016 240
PCP11	.399	1.094	0.106 93	0.013 199	0.078 98	0.018 164	0.000 17	0.006 299	0.005 25	0.007 176	0.010 272
PCP12	.501	0.789	0.122 55	0.027 160	0.016 113	0.007 140	0.006 319	0.004 104	0.010 125	0.000 47	0.013 237
PCP13	.600	0.556	0.149 29	0.014 138	0.013 116	0.007 101	0.010 195	0.001 146	0.004 139	0.000 14	0.012 241
PCP14	.701	0.419	0.168 7	0.003 146	0.005 289	0.006 300	0.011 178	0.003 62	0.003 118	0.006 3	0.012 288
PCP15	.800	0.231	0.162 1	0.009 286	0.012 300	0.006 329	0.010 236	0.001 152	0.005 247	0.007 101	0.010 196
PCP16	.900	-0.029	0.171 359	0.006 59	0.008 215	0.009 12	0.002 219	0.003 348	0.001 207	0.006 310	0.006 126
PCP17	.969	-0.081	0.029 352	0.003 23	0.005 270	0.005 21	0.002 268	0.003 346	0.003 14	0.000 46	0.004 151

FORCED PITCHING OSCILLATION AIRFOIL MLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.68	0.052	0.603	2.46	0.0	12.50	12143.3	20

V	Q	PN	CM(MIN)	CN(MAX)	ALPHA.MMAX	ASPD RAMP	TRP	PIT RAMP
223.6 (733.6)	128189. (2677.2)	0.10P 00	-0.091	1.118	14.09	-0.00127	1.178	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.500	2.463 0	0.076 29	0.035 291	0.010 86	0.019 350	0.000 68	0.005 135	0.027 264	0.029 271
CN		1.029	0.980 44	0.017 216	0.000 236	0.002 313	0.000 172	0.004 344	0.005 299	0.000 121	0.000 253
CM		-0.052	0.033 193	0.002 94	0.001 98	0.002 25	0.003 319	0.001 63	0.001 25	0.001 155	0.002 47
PCP 1	.010	2.906	0.269 0	0.019 52	0.008 281	0.014 337	0.006 47	0.005 186	0.002 156	0.004 30	0.005 234
PCP 2	.020	2.833	0.258 6	0.031 71	0.013 150	0.007 4	0.007 191	0.003 84	0.006 100	0.003 98	0.002 213
PCP 3	.030	2.821	0.055 120	0.111 85	0.047 145	0.006 94	0.010 120	0.021 64	0.003 300	0.011 71	0.007 290
PCP 4	.049	2.568	0.087 28	0.068 82	0.027 136	0.021 67	0.000 73	0.004 288	0.000 191	0.000 98	0.002 334
PCP 5	.074	2.601	0.704 148	0.048 110	0.051 164	0.017 95	0.007 174	0.004 71	0.011 241	0.012 189	0.000 354
PCP 6	.099	2.259	0.189 163	0.070 210	0.050 192	0.008 186	0.032 219	0.004 342	0.010 260	0.007 101	0.000 349
PCP 7	.149	1.999	0.154 149	0.175 220	0.099 276	0.020 331	0.026 242	0.023 333	0.007 26	0.009 139	0.010 8
PCP 8	.200	1.743	0.115 128	0.112 232	0.049 294	0.014 8	0.018 188	0.021 16	0.017 153	0.019 180	0.001 269
PCP 9	.250	1.478	0.107 105	0.010 241	0.010 188	0.011 10	0.006 127	0.013 25	0.007 240	0.017 169	0.017 295
PCP10	.300	1.285	0.094 90	0.019 224	0.002 351	0.012 28	0.009 245	0.004 357	0.006 148	0.004 202	0.015 278
PCP11	.399	1.090	0.107 55	0.013 47	0.004 95	0.016 317	0.008 149	0.011 326	0.000 213	0.006 284	0.012 276
PCP12	.501	0.894	0.130 40	0.015 300	0.007 247	0.009 326	0.013 184	0.003 290	0.010 224	0.007 327	0.011 237
PCP13	.600	0.717	0.151 27	0.015 215	0.011 275	0.012 262	0.018 172	0.005 310	0.012 248	0.005 91	0.016 231
PCP14	.701	0.617	0.157 14	0.015 199	0.011 268	0.009 185	0.013 164	0.002 189	0.006 102	0.004 229	0.011 265
PCP15	.800	0.439	0.163 4	0.004 139	0.008 291	0.012 209	0.012 149	0.004 79	0.013 221	0.006 36	0.009 307
PCP16	.900	0.100	0.113 8	0.017 212	0.003 243	0.013 157	0.012 115	0.003 266	0.002 218	0.001 346	0.006 243
PCP17	.969	-0.043	0.093 6	0.011 229	0.004 140	0.007 197	0.012 76	0.004 208	0.010 128	0.001 343	0.000 193

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.17	0.101	0.696	2.03	0.0	2.43	12148.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
227.3 (745.8)	127898. (2671.2)	0.108 08	-0.023	0.815	5.15	-0.00100	1.024	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.423	2.833 0	0.098 14	0.005 245	0.025 113	0.031 48	0.002 332	0.011 237	0.011 150	0.000 351
CN		0.474	0.326 346	0.086 253	0.005 148	0.004 26	0.003 267	0.003 16	0.002 231	0.002 48	0.001 217
CM		-0.007	0.016 296	0.003 84	0.002 311	0.001 130	0.000 57	0.000 227	0.000 81	0.000 160	0.000 1
DCP 1	.010	0.495	1.203 336	0.112 27	0.011 146	0.008 182	0.003 4	0.007 335	0.009 0	0.006 74	0.004 29
DCP 2	.020	0.624	1.049 341	0.104 30	0.011 139	0.005 208	0.003 100	0.004 43	0.004 78	0.004 130	0.002 340
DCP 3	.030	0.751	0.878 340	0.099 34	0.008 142	0.005 319	0.003 100	0.002 25	0.003 56	0.003 111	0.001 306
DCP 4	.049	1.076	0.681 340	0.104 37	0.007 165	0.007 331	0.006 78	0.003 45	0.004 38	0.004 111	0.000 351
DCP 5	.074	1.219	0.727 339	0.078 35	0.007 169	0.006 208	0.005 234	0.003 51	0.002 99	0.003 105	0.001 142
DCP 6	.099	1.357	0.732 339	0.107 39	0.025 127	0.004 269	0.012 65	0.011 111	0.003 155	0.004 80	0.004 150
DCP 7	.149	1.250	0.854 336	0.125 46	0.658 266	0.074 357	0.636 109	0.036 298	0.036 23	0.015 150	0.021 300
DCP 8	.200	0.962	0.800 341	0.020 90	0.126 239	0.016 48	0.076 240	0.025 339	0.050 191	0.032 274	0.020 137
DCP 9	.250	0.946	0.871 337	0.193 206	0.100 280	0.126 158	0.022 243	0.006 98	0.012 286	0.047 34	0.021 217
DCP10	.300	0.736	0.657 348	0.253 223	0.118 109	0.036 94	0.049 0	0.008 268	0.021 267	0.015 132	0.003 21
DCP11	.399	0.455	0.276 350	0.061 227	0.003 97	0.043 327	0.003 48	0.021 279	0.015 161	0.004 45	0.004 115
DCP12	.501	0.297	0.136 21	0.036 19	0.008 99	0.016 311	0.011 197	0.007 61	0.003 301	0.002 271	0.001 280
DCP13	.600	0.269	0.101 29	0.036 28	0.010 241	0.002 242	0.002 170	0.003 340	0.001 277	0.002 192	0.002 280
DCP14	.701	0.322	0.067 37	0.024 13	0.000 225	0.001 246	0.000 265	0.002 112	0.001 332	0.002 280	0.001 307
DCP15	.800	0.124	0.039 36	0.009 0	0.002 283	0.002 319	0.001 167	0.000 207	0.002 292	0.002 0	0.000 129
DCP16	.900	-0.125	0.009 25	0.005 249	0.006 196	0.004 316	0.001 241	0.001 54	0.001 334	0.001 4	0.001 237
DCP17	.969	-0.074	0.015 192	0.004 268	0.004 210	0.002 356	0.000 188	0.002 96	0.002 320	0.001 0	0.003 165

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.49	0.101	0.703	2.66	0.0	7.42	12147.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
229.7 (753.7)	129688. (2708.6)	0.10E 08	-0.062	1.116	8.39	-0.00200	3.787	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.417	2.658 0	0.035 18	0.026 188	0.112 68	0.020 17	0.008 233	0.010 161	0.006 121	0.018 357
CN		0.864	0.194 45	0.063 61	0.007 37	0.017 82	0.005 12	0.006 318	0.001 245	0.004 203	0.003 117
CM		-0.010	0.034 231	0.006 194	0.003 115	0.004 220	0.003 148	0.003 109	0.001 104	0.002 28	0.000 93
DCP 1	.010	2.277	0.649 359	0.103 43	0.017 82	0.029 47	0.003 32	0.004 82	0.005 287	0.006 54	0.001 246
DCP 2	.020	2.047	0.652 4	0.077 25	0.021 43	0.028 46	0.010 28	0.005 21	0.001 35	0.001 105	0.001 38
DCP 3	.030	1.974	0.613 4	0.062 10	0.025 22	0.023 42	0.013 10	0.004 15	0.003 357	0.003 71	0.002 88
DCP 4	.049	2.080	0.468 5	0.047 352	0.008 75	0.015 26	0.006 2	0.004 [illegible]	0.005 298	0.001 134	0.005 324
DCP 5	.074	2.121	0.408 6	0.049 5	0.002 46	0.005 48	0.006 45	0.005 296	0.006 279	0.002 150	0.001 356
DCP 6	.099	2.150	0.321 9	0.068 31	0.019 321	0.013 230	0.016 119	0.008 346	0.008 275	0.005 197	0.002 19
DCP 7	.149	2.074	0.192 24	0.137 50	0.057 320	0.024 213	0.014 109	0.006 317	0.006 207	0.004 105	0.002 26
DCP 8	.200	1.[illegible] 0	0.178 122	0.200 69	0.063 4	0.016 82	0.021 347	0.[illegible] 332	0.[illegible] 295	0.010 258	0.008 159
DCP 9	.250	1.9[illegible]	0.384 123	0.349 134	0.079 64	0.060 119	0.017 102	0.009 64	0.035 89	0.024 5	0.028 35
DCP10	.300	1.29	0.329 95	0.177 126	0.101 173	0.062 158	0.[illegible] 165	0.012 185	0.030 114	0.023 116	0.031 148
DCP11	.399	0.94	0.239 46	0.130 76	0.037 143	0.030 109	0.007 288	0.014 346	0.009 338	0.008 272	0.011 133
DCP12	.501	0.64	0.303 35	0.140 62	0.031 92	0.044 77	0.026 115	0.004 22	0.004 343	0.022 244	0.007 183
DCP13	.600	0.466	0.254 41	0.067 32	0.024 7	0.049 60	0.031 38	0.019 [illegible]	0.006 116	0.016 122	0.010 81
DCP14	.701	0.375	0.172 51	0.038 321	0.034 309	0.024 4	0.030 325	0.025 321	0.[illegible] 321	0.009 263	0.014 334
DCP15	.830	0.[illegible]	0.139 41	0.036 302	0.019 278	0.023 356	0.021 309	0.[illegible] 269	0.[illegible] 248	0.015 197	0.007 274
DCP16	.900	-0.062	0.112 24	0.030 317	0.027 288	0.011 307	0.014 291	0.[illegible] 231	0.008 241	0.007 172	0.00[illegible] 226
DCP17	.969	-0.077	0.034 37	0.011 357	0.015 306	0.014 [illegible]	0.0[illegible] 313	0.006 247	0.007 351	0.008 258	0.0[illegible] 32

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.26	0.101	0.701	2.62	0.0	9.93	12147.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.8 (750.6)	129253. (2699.5)	0.10E 08	-0.095	1.084	11.04	-0.00121	2.232	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.932	2.619	0	0.101	24	0.046	228	0.070	145	0.007	334	0.004	73	0.008	249	0.015	160	0.011	335
CN		0.929	0.139	51	0.022	66	0.005	67	0.002	152	0.003	239	0.002	144	0.003	317	0.002	34	0.000	201
CM		-0.019	0.031	210	0.001	181	0.002	128	0.002	298	0.002	39	0.001	325	0.001	133	0.001	228	0.000	74
DCP 1	.010	2.710	0.394	2	0.061	58	0.007	241	0.017	183	0.003	165	0.005	1	0.006	92	0.003	9	0.003	194
DCP 2	.020	2.475	0.450	6	0.081	77	0.001	22	0.012	230	0.007	215	0.004	49	0.004	86	0.003	308	0.003	191
DCP 3	.030	2.388	0.461	4	0.061	72	0.011	163	0.010	208	0.004	202	0.006	25	0.001	303	0.001	168	0.002	57
DCP 4	.049	2.379	0.359	6	0.075	67	0.015	337	0.014	229	0.008	205	0.004	119	0.004	40	0.004	323	0.004	155
DCP 5	.074	2.311	0.201	19	0.136	70	0.043	348	0.013	289	0.016	260	0.007	167	0.006	93	0.007	313	0.009	176
DCP 6	.099	2.254	0.114	91	0.175	67	0.034	5	0.027	21	0.019	282	0.000	156	0.005	234	0.002	257	0.008	148
DCP 7	.149	2.063	0.228	121	0.090	95	0.061	109	0.025	30	0.012	72	0.011	31	0.003	345	0.002	311	0.005	158
DCP 8	.200	1.549	0.340	135	0.023	117	0.075	126	0.007	246	0.026	100	0.009	123	0.014	85	0.005	57	0.006	41
DCP 9	.250	1.453	0.145	107	0.049	234	0.020	232	0.030	282	0.017	351	0.008	218	0.011	263	0.007	53	0.008	184
DCP10	.300	1.272	0.149	70	0.017	309	0.030	96	0.014	277	0.007	338	0.011	212	0.006	8	0.006	351	0.012	309
DCP11	.399	1.060	0.195	72	0.016	227	0.006	36	0.019	190	0.009	317	0.007	332	0.016	262	0.006	63	0.008	75
DCP12	.501	0.788	0.213	54	0.019	141	0.002	282	0.016	146	0.003	264	0.009	335	0.004	49	0.005	209	0.013	348
DCP13	.600	0.556	0.217	36	0.015	73	0.006	284	0.009	128	0.017	212	0.012	134	0.002	98	0.003	89	0.011	203
DCP14	.701	0.416	0.184	21	0.017	21	0.017	334	0.012	95	0.012	212	0.009	172	0.005	3	0.008	356	0.004	236
DCP15	.800	0.228	0.149	13	0.021	42	0.013	290	0.006	64	0.004	255	0.009	130	0.009	319	0.004	99	0.005	119
DCP16	.900	-0.033	0.093	13	0.018	36	0.010	302	0.005	103	0.007	189	0.007	101	0.008	301	0.004	327	0.004	234
DCP17	.969	-0.086	0.027	25	0.015	73	0.008	17	0.003	31	0.007	218	0.006	241	0.008	303	0.004	278	0.006	297

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.34	0.102	0.697	2.61	0.0	12.45	12147.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
227.0 (744.9)	127759 (2668. .	0.10E 08	-0.090	1.164	13.82	-0.00120	2.197	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.446	2.606	0	0.085	12	0.039	222	0.018	267	0.041	10	0.013	163	0.010	134	0.009	174	0.010	5
CN		1.040	0.121	49	0.012	178	0.001	271	0.009	269	0.010	22	0.005	219	0.001	215	0.003	241	0.304	215
CM		-0.056	0.035	206	0.004	337	0.002	191	0.003	27	0.003	161	0.001	7	0.001	25	0.001	4	0.001	27
DCP 1	.010	3.032	0.296	153	0.028	81	0.004	42	0.007	287	0.006	311	0.001	162	0.004	156	0.000	12	0.003	57
DCP 2	.020	2.830	0.313	8	0.039	66	0.008	181	0.008	333	0.003	340	0.006	56	0.003	234	0.006	325	0.002	213
DCP 3	.030	2.577	0.127	42	0.112	71	0.023	104	0.025	10	0.005	82	0.020	27	0.009	293	0.009	328	0.010	236
DCP 4	.049	2.614	0.180	20	0.066	69	0.012	89	0.009	317	0.004	27	0.005	169	0.007	88	0.006	327	0.005	21
DCP 5	.074	2.435	0.104	97	0.037	73	0.049	141	0.009	178	0.016	79	0.003	279	0.009	29	0.006	262	0.012	33
DCP 6	.099	2.255	0.213	143	0.027	238	0.057	164	0.025	225	0.007	147	0.011	250	0.007	42	0.007	262	0.006	338
DCP 7	.149	1.964	0.187	136	0.101	227	0.047	251	0.034	287	0.015	313	0.019	272	0.009	314	0.015	52	0.007	264
DCP 8	.200	1.558	0.136	123	0.083	223	0.052	260	0.030	354	0.003	10	0.003	300	0.015	324	0.004	231	0.009	191
DCP 9	.250	1.537	0.169	88	0.014	230	0.010	150	0.033	342	0.030	61	0.010	175	0.007	185	0.012	275	0.007	218
DCP10	.300	1.331	0.157	71	0.006	180	0.018	330	0.020	333	0.014	79	0.006	218	0.013	120	0.016	7	0.005	100
DCP11	.399	1.075	0.168	39	0.031	32	0.015	102	0.022	336	0.029	69	0.007	141	0.004	52	0.008	321	0.009	150
DCP12	.501	0.879	0.183	40	0.009	236	0.011	354	0.017	237	0.020	37	0.011	278	0.005	297	0.021	221	0.020	231
DCP13	.600	0.740	0.174	33	0.014	171	0.016	22	0.014	216	0.018	39	0.019	250	0.002	115	0.021	206	0.011	262
DCP14	.701	0.636	0.169	26	0.025	153	0.007	7	0.015	193	0.018	312	0.008	180	0.005	207	0.006	96	0.001	125
DCP15	.800	0.445	0.156	21	0.017	144	0.008	86	0.017	204	0.016	304	0.014	162	0.010	196	0.005	11	0.008	228
DCP16	.900	0.111	0.110	20	0.023	162	0.008	327	0.016	192	0.016	318	0.004	123	0.004	258	0.010	120	0.006	131
DCP17	.969	-0.026	0.036	51	0.014	165	0.005	281	0.013	229	0.003	307	0.004	42	0.002	32	0.004	241	0.002	88

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.88	0.153	0.702	3.17	0.0	-0.02	12149.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
229.8 (754.1)	129655. (2707.9)	0.10E 08	-0.039	0.441	3.13	-0.00084	1.568	0.0

HARMONIC ANALYSIS

DATA TYPE	X/	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.019	3.169	0	0.120	306	0.091	198	0.030	91	0.015	22	0.011	55	0.007	185	0.014	240	0.006	97
CN		0.140	0.299	347	0.004	308	0.005	190	0.031	86	0.001	177	0.001	170	0.001	337	0.001	227	0.003	67
CM		-0.018	0.022	294	0.000	221	0.001	93	0.000	111	0.001	315	0.000	280	0.001	20	0.000	67	0.001	240
DCP 1	.010	-0.901	1.718	329	0.083	356	0.099	263	0.061	317	0.024	339	0.023	264	0.024	301	0.006	338	0.007	297
DCP 2	.020	-0.724	1.515	335	0.155	24	0.009	353	0.029	352	0.050	36	0.028	94	0.006	49	0.018	61	0.015	187
DCP 3	.030	-0.428	1.371	335	0.212	31	0.075	93	0.024	128	0.043	49	0.036	106	0.036	166	0.005	151	0.030	114
DCP 4	.049	0.072	1.145	335	0.145	35	0.118	96	0.134	153	0.097	214	0.073	271	0.032	327	0.005	261	0.027	297
DCP 5	.074	0.385	0.840	336	0.037	193	0.065	263	0.018	332	0.009	351	0.003	62	0.001	82	0.007	64	0.005	78
DCP 6	.099	0.531	0.866	337	0.049	198	0.049	269	0.013	168	0.016	14	0.007	121	0.008	355	0.006	143	0.004	353
DCP 7	.149	0.449	0.793	337	0.153	211	0.057	88	0.022	242	0.046	47	0.041	273	0.021	108	0.017	253	0.029	181
DCP 8	.200	0.232	0.468	348	0.069	235	0.073	120	0.078	352	0.073	229	0.061	104	0.035	349	0.012	234	0.003	290
DCP 9	.250	0.209	0.376	347	0.038	2	0.036	235	0.014	119	0.006	20	0.001	37	0.002	222	0.004	85	0.004	213
DCP10	.300	0.213	0.327	348	0.023	350	0.021	227	0.007	98	0.004	30	0.001	245	0.002	200	0.002	61	0.003	282
DCP11	.399	0.191	0.265	1	0.012	6	0.013	252	0.004	140	0.004	103	0.001	82	0.003	209	0.002	95	0.004	4
DCP12	.501	0.147	0.199	6	0.007	15	0.008	261	0.002	205	0.003	118	0.003	266	0.001	161	0.002	242	0.005	6
DCP13	.600	0.163	0.145	15	0.005	357	0.007	253	0.001	178	0.002	131	0.001	142	0.001	174	0.003	225	0.006	45
DCP14	.701	0.253	0.094	24	0.007	14	0.006	263	0.001	195	0.004	138	0.001	91	0.003	227	0.002	226	0.004	57
DCP15	.800	0.088	0.052	48	0.002	45	0.002	274	0.002	284	0.003	150	0.001	286	0.001	216	0.001	131	0.004	100
DCP16	.900	-0.126	0.026	110	0.005	157	0.003	319	0.000	232	0.002	276	0.001	214	0.004	189	0.002	80	0.003	115
DCP17	.969	-0.057	0.030	174	0.003	159	0.002	103	0.001	137	0.004	103	0.001	179	0.002	350	0.007	277	0.000	63

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.97	0.153	0.700	3.12	0.0	2.42	12149.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.8 (750.8)	129176 (2697.9)	0.10E 08	-0.030	0.806	5.44	-0.00089	1.670	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.421	3.122	0	0.134	352	0.129	170	0.037	79	0.012	322	0.013	125	0.008	11	0.009	167	0.011	256
CN		0.477	0.306	344	0.005	245	0.008	139	0.006	22	0.005	216	0.002	347	0.003	170	0.002	314	0.003	157
CM		-0.007	0.022	285	0.002	64	0.001	302	0.001	122	0.000	68	0.000	151	0.000	320	0.000	116	0.000	199
DCP 1	.010	0.677	1.227	328	0.116	356	0.042	98	0.002	122	0.006	78	0.004	59	0.003	215	0.003	112	0.003	117
DCP 2	.020	0.624	1.008	335	0.105	14	0.029	120	0.003	216	0.007	88	0.002	154	0.002	501	0.003	92	0.002	116
DCP 3	.030	0.749	0.848	334	0.101	15	0.021	120	0.003	199	0.006	65	0.002	121	0.002	307	0.002	30	0.002	89
DCP 4	.049	1.071	0.775	334	0.104	17	0.023	130	0.004	280	0.007	59	0.005	166	0.005	314	0.004	16	0.002	113
DCP 5	.074	1.213	0.703	334	0.077	13	0.021	135	0.010	156	0.007	169	0.003	173	0.002	271	0.004	11	0.004	186
DCP 6	.099	1.349	0.707	334	0.105	22	0.036	121	0.004	248	0.012	45	0.009	116	0.004	241	0.007	19	0.007	114
DCP 7	.149	1.247	0.819	332	0.130	32	0.050	218	0.007	327	0.036	73	0.036	225	0.038	325	0.023	85	0.026	212
DCP 8	.200	0.955	0.776	336	0.025	84	0.126	264	0.022	33	0.081	200	0.034	290	0.050	131	0.040	211	0.025	59
DCP 9	.250	0.974	0.866	331	0.180	185	0.102	297	0.146	110	0.032	220	0.096	34	0.025	224	0.053	319	0.033	179
DCP10	.300	0.731	0.614	340	0.246	207	0.126	84	0.048	42	0.053	292	0.008	149	0.019	195	0.011	92	0.007	170
DCP11	.399	0.453	0.262	8	0.051	223	0.078	77	0.046	294	0.008	169	0.012	230	0.014	108	0.004	321	0.002	350
DCP12	.501	0.303	0.156	35	0.044	2	0.006	186	0.009	261	0.005	162	0.003	18	0.001	236	0.003	239	0.001	47
DCP13	.600	0.277	0.124	42	0.037	6	0.014	225	0.002	192	0.000	308	0.001	186	0.001	204	0.002	265	0.002	348
DCP14	.701	0.345	0.086	51	0.021	0	0.010	208	0.001	66	0.000	225	0.001	161	0.001	81	0.002	292	0.001	237
DCP15	.800	0.125	0.050	53	0.003	0	0.005	216	0.004	317	0.002	260	0.001	62	0.002	16	0.001	296	0.002	146
DCP16	.900	-0.123	0.009	48	0.003	166	0.005	145	0.004	0	0.002	142	0.003	264	0.002	270	0.000	59	0.002	151
DCP17	.969	-0.076	0.018	190	0.005	195	0.005	161	0.004	293	0.001	329	0.003	348	0.002	189	0.003	354	0.002	347

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.11	0.154	0.699	2.97	0.0	4.96	12149.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.2 (748.6)	128716 (2688.3)	0.10E 08	-0.044	1.075	8.87	-0.00094	1.742	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.957	2.969	0	0.333	7	0.095	176	0.052	115	0.017	24	0.010	226	0.002	313	0.015	147	0.000	285
CN		0.712	0.333	6	0.028	317	0.010	182	0.001	139	0.006	289	0.000	304	0.003	15	0.004	279	0.003	177
CM		-0.005	0.029	236	0.018	48	0.002	285	0.002	237	0.003	100	0.002	353	0.002	243	0.002	97	0.000	356
DCP 1	.010	1.673	1.058	337	0.127	30	0.012	36	0.013	111	0.002	112	0.004	297	0.001	25	0.007	250	0.005	143
DCP 2	.020	1.472	0.917	344	0.062	32	0.028	118	0.014	147	0.010	98	0.004	324	0.004	10	0.005	302	0.002	167
DCP 3	.030	1.473	0.762	343	0.032	22	0.036	117	0.012	148	0.013	83	0.004	319	0.005	7	0.006	288	0.002	185
DCP 4	.049	1.479	0.624	344	0.056	23	0.036	108	0.007	89	0.004	74	0.004	305	0.002	195	0.003	199	0.003	162
DCP 5	.074	1.756	0.582	344	0.372	34	0.031	102	0.006	86	0.003	95	0.001	225	0.002	167	0.003	220	0.003	192
DCP 6	.099	1.880	0.524	345	0.069	37	0.018	99	0.006	46	0.002	250	0.001	239	0.002	170	0.001	208	0.001	202
DCP 7	.149	1.850	0.490	344	0.076	30	0.023	96	0.008	139	0.009	222	0.003	282	0.003	343	0.001	104	0.000	96
DCP 8	.200	1.430	0.570	354	0.207	36	0.157	130	0.078	195	0.062	268	0.022	330	0.010	3	0.005	101	0.012	18
DCP 9	.250	1.263	0.743	10	0.284	14	0.035	188	0.019	20	0.020	51	0.032	80	0.014	174	0.035	107	0.040	101
DCP10	.300	1.045	0.665	10	0.213	11	0.159	292	0.100	299	0.013	188	0.017	334	0.048	323	0.032	290	0.037	228
DCP11	.399	0.737	0.465	13	0.081	255	0.070	271	0.004	148	0.044	247	0.010	243	0.020	199	0.005	208	0.009	205
DCP12	.501	0.530	0.344	16	0.122	244	0.052	205	0.034	155	0.028	147	0.021	26	0.007	97	0.009	13	0.005	335
DCP13	.600	0.396	0.231	28	0.112	236	0.051	156	0.041	106	0.027	36	0.022	327	0.008	218	0.011	284	0.011	180
DCP14	.701	0.341	0.149	59	0.075	222	0.047	96	0.028	29	0.033	304	0.026	211	0.018	102	0.009	310	0.003	85
DCP15	.800	0.137	0.099	52	0.047	214	0.027	50	0.008	322	0.017	275	0.018	161	0.018	29	0.014	291	0.005	86
DCP16	.900	-0.106	0.054	5	0.041	202	0.020	37	0.010	354	0.020	247	0.014	130	0.011	22	0.010	248	0.003	126
DCP17	.969	-0.088	0.013	12	0.025	241	0.005	25	0.007	91	0.009	298	0.004	206	0.005	117	0.005	44	0.009	380

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.71	0.153	0.699	2.83	0.0	7.43	12151.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.7 (750.3)	128827. (2690.6)	0.10E 08	-0.084	1.202	9.99	-0.00160	2.977	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.431	2.833	0	0.259	40	0.058	195	0.034	130	0.014	12	0.004	156	0.013	191	0.027	151	0.007	309
CN		0.871	0.298	42	0.018	21	0.012	313	0.005	155	0.008	335	0.003	193	0.003	140	0.003	68	0.002	50
CM		-0.017	0.053	223	0.017	93	0.004	101	0.001	302	0.003	116	0.003	14	0.002	312	0.002	234	0.001	285
DCP 1	.010	2.269	0.782	353	0.145	84	0.021	261	0.013	97	0.005	110	0.006	341	0.004	109	0.006	26	0.008	246
DCP 2	.020	2.043	0.777	0	0.087	105	0.040	329	0.012	160	0.007	31	0.009	42	0.004	253	0.007	102	0.004	310
DCP 3	.030	1.981	0.719	358	0.054	116	0.040	336	0.006	149	0.012	325	0.007	69	0.005	301	0.005	50	0.003	295
DCP 4	.049	2.095	0.563	359	0.039	137	0.020	322	0.008	203	0.006	311	0.000	234	0.003	304	0.002	203	0.002	275
DCP 5	.074	2.133	0.497	0	0.034	117	0.017	296	0.013	174	0.004	331	0.002	240	0.001	268	0.001	178	0.002	276
DCP 6	.099	2.193	0.407	6	0.043	65	0.034	256	0.022	156	0.006	10	0.005	249	0.002	249	0.003	183	0.002	260
DCP 7	.149	2.053	0.289	28	0.116	24	0.056	240	0.015	142	0.009	158	0.004	95	0.002	19	0.003	256	0.003	245
DCP 8	.200	1.529	0.331	98	0.203	33	0.036	328	0.038	282	0.019	214	0.007	184	0.013	191	0.015	84	0.010	322
DCP 9	.250	1.526	0.513	101	0.051	61	0.112	41	0.038	96	0.042	332	0.039	328	0.011	205	0.031	266	0.008	197
DCP10	.300	1.294	0.470	84	0.188	117	0.063	159	0.006	334	0.040	69	0.037	64	0.023	66	0.019	342	0.004	48
DCP11	.399	0.889	0.436	46	0.113	86	0.009	78	0.037	239	0.004	95	0.005	259	0.021	318	0.027	181	0.017	52
DCP12	.501	0.655	0.442	38	0.058	26	0.037	24	0.028	101	0.021	82	0.009	140	0.009	230	0.009	147	0.005	254
DCP13	.600	0.506	0.368	39	0.078	311	0.060	346	0.019	43	0.043	0	0.017	348	0.013	314	0.009	49	0.004	79
DCP14	.701	0.421	0.256	41	0.121	271	0.042	280	0.009	200	0.040	300	0.028	232	0.018	197	0.007	115	0.013	134
DCP15	.800	0.221	0.208	30	0.101	258	0.024	248	0.016	169	0.022	248	0.027	172	0.023	106	0.019	17	0.003	233
DCP16	.900	-0.038	0.168	15	0.079	266	0.031	221	0.004	57	0.016	232	0.021	176	0.020	111	0.013	31	0.006	43
DCP17	.969	-0.064	0.056	17	0.029	273	0.018	241	0.006	58	0.012	272	0.009	284	0.017	148	0.021	68	0.016	241

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	68.80	0.153	0.699	2.88	0.0	9.94	12151.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.3 (749.1)	128659. (2687.1)	0.10E 08	-0.062	1.190	11.49	-0.00113	2.107	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.939	2.885	0	0.154	15	0.015	170	0.051	103	0.019	23	0.003	186	0.007	157	0.024	141	0.007	315
CN		0.944	0.211	52	0.016	43	0.025	32	0.002	28	0.002	205	0.002	254	0.004	37	0.001	180	0.001	174
CM		-0.023	0.042	216	0.005	34	0.005	177	0.002	255	0.002	6	0.001	157	0.001	219	0.000	349	0.001	327
DCP 1	.010	2.704	0.491	356	0.068	80	0.007	120	0.005	246	0.007	338	0.001	105	0.004	24	0.002	47	0.001	104
DCP 2	.020	2.449	0.531	6	0.097	80	0.009	302	0.003	220	0.001	275	0.004	159	0.004	99	0.005	32	0.007	314
DCP 3	.030	2.322	0.475	6	0.124	73	0.023	300	0.011	192	0.004	111	0.006	67	0.005	342	0.001	294	0.002	262
DCP 4	.049	2.376	0.433	5	0.064	61	0.024	311	0.010	127	0.005	118	0.002	171	0.002	332	0.002	117	0.002	330
DCP 5	.074	2.308	0.284	23	0.130	44	0.046	298	0.003	80	0.007	200	0.001	151	0.002	156	0.004	76	0.002	50
DCP 6	.099	2.248	0.210	73	0.176	38	0.026	323	0.040	349	0.024	236	0.007	188	0.010	145	0.004	42	0.001	136
DCP 7	.149	2.063	0.293	102	0.122	27	0.066	69	0.044	318	0.021	30	0.021	260	0.007	353	0.011	207	0.003	340
DCP 8	.200	1.622	0.353	112	0.046	5	0.098	94	0.017	246	0.039	43	0.007	228	0.013	356	0.010	346	0.014	270
DCP 9	.250	1.508	0.300	101	0.092	244	0.030	15	0.014	231	0.008	303	0.003	99	0.004	118	0.014	192	0.007	230
DCP10	.300	1.263	0.235	63	0.035	358	0.049	64	0.009	246	0.008	277	0.015	223	0.004	161	0.008	177	0.013	167
DCP11	.399	1.067	0.302	66	0.006	176	0.042	45	0.020	173	0.008	339	0.015	109	0.018	20	0.014	53	0.002	95
DCP12	.501	0.813	0.307	54	0.034	152	0.052	32	0.013	98	0.003	72	0.003	227	0.012	64	0.019	313	0.011	13
DCP13	.600	0.583	0.279	41	0.013	174	0.046	17	0.017	59	0.018	257	0.002	332	0.009	10	0.012	170	0.007	134
DCP14	.701	0.435	0.224	27	0.014	154	0.023	328	0.005	108	0.017	167	0.003	12	0.006	84	0.004	112	0.008	286
DCP15	.800	0.246	0.186	18	0.009	237	0.016	312	0.013	47	0.019	172	0.006	322	0.010	307	0.006	282	0.004	165
DCP16	.900	-0.029	0.121	23	0.007	317	0.009	308	0.008	25	0.007	158	0.013	344	0.005	161	0.001	23	0.007	53
DCP17	.969	-0.088	0.043	44	0.008	294	0.008	302	0.002	310	0.002	328	0.007	241	0.004	88	0.004	85	0.009	226

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.18	0.166	0.208	4.86	0.0	0.04	12981.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
70.9 (232.6)	12889. (269.2)	0.33E 07	-0.047	0.519	4.75	-0.00137	0.795	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.043	4.858	0	0.216	4	0.026	241	0.001	10	0.010	340	0.005	127	0.028	221	0.006	335	0.002	23
CN		0.134	0.396	358	0.014	27	0.003	83	0.002	111	0.002	317	0.004	193	0.004	353	0.008	235	0.004	86
CM		-0.024	0.019	296	0.003	315	0.001	315	0.000	26	0.000	136	0.001	88	0.001	235	0.002	99	0.001	265
DCP 1	.010	-0.459	2.872	346	0.178	23	0.031	82	0.011	206	0.012	279	0.018	147	0.007	252	0.018	302	0.013	340
DCP 2	.020	-0.439	2.092	349	0.081	347	0.011	65	0.008	244	0.009	232	0.023	160	0.009	256	0.014	276	0.003	66
DCP 3	.030	0.088	1.749	349	0.059	334	0.001	123	0.002	210	0.003	249	0.017	144	0.003	9	0.008	265	0.004	55
DCP 4	.049	-0.036	1.411	350	0.049	342	0.005	14	0.004	107	0.007	260	0.010	185	0.010	334	0.004	313	0.010	119
DCP 5	.074	0.177	1.143	350	0.041	347	0.010	349	0.005	64	0.003	279	0.014	178	0.005	357	0.007	277	0.012	89
DCP 6	.099	0.394	0.976	352	0.032	358	0.010	356	0.012	68	0.001	136	0.007	208	0.010	359	0.010	273	0.007	141
DCP 7	.149	0.201	0.730	353	0.032	18	0.012	7	0.012	36	0.012	314	0.009	133	0.014	311	0.007	273	0.013	75
DCP 8	.200	0.228	0.592	357	0.025	3	0.010	86	0.007	173	0.005	79	0.007	193	0.011	358	0.008	315	0.002	31
DCP 9	.250	0.148	0.517	357	0.024	23	0.006	9	0.010	100	0.004	332	0.007	236	0.009	322	0.007	338	0.003	356
DCP10	.300	0.238	0.437	358	0.020	23	0.006	146	0.006	107	0.004	228	0.007	155	0.003	53	0.004	9	0.007	76
DCP11	.399	0.244	0.353	5	0.016	45	0.007	222	0.003	149	0.007	322	0.007	162	0.008	318	0.017	266	0.006	68
DCP12	.501	0.133	0.264	11	0.008	46	0.008	108	0.005	180	0.004	6	0.092	114	0.005	31	0.011	272	0.003	184
DCP13	.600	0.156	0.201	16	0.007	84	0.011	127	0.002	40	0.004	120	0.006	183	0.006	295	0.013	302	0.005	177
DCP14	.701	0.205	0.150	20	0.014	108	0.003	64	0.006	103	0.012	352	0.005	237	0.006	162	0.010	300	0.005	73
DCP15	.800	0.113	0.096	29	0.012	119	0.002	213	0.003	307	0.005	318	0.004	280	0.003	88	0.012	293	0.011	98
DCP16	.900	-0.072	0.022	81	0.009	121	0.007	8	0.008	263	0.007	194	0.004	230	0.010	45	0.013	185	0.003	219
DCP17	.969	0.027	0.022	166	0.009	276	0.003	218	0.006	117	0.006	194	0.013	297	0.008	24	0.009	25	0.011	8

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.21	0.172	0.202	4.87	0.0	2.47	12001.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
68.6 (225.0)	12209. (255.0)	0.32E 07	-0.040	0.779	7.40	-0.00846	0.820	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.409	4.868	0	0.226	4	0.043	266	0.092	246	0.015	37	0.012	68	0.031	195	0.011	134	0.004	26
CN		0.361	0.407	358	0.017	18	0.004	351	0.002	14	0.008	118	0.002	287	0.004	157	0.014	131	0.001	50
CM		-0.017	0.020	293	0.001	290	0.001	143	0.000	109	0.000	117	0.001	110	0.001	349	0.006	319	0.002	216
DCP 1	.010	0.964	2.750	346	0.127	10	0.015	10	0.010	318	0.002	91	0.006	345	0.011	139	0.012	43	0.017	184
DCP 2	.020	0.726	2.153	349	0.088	3	0.027	340	0.006	316	0.007	136	0.004	29	0.021	236	0.018	70	0.011	162
DCP 3	.030	0.989	1.819	347	0.066	355	0.027	336	0.008	359	0.006	172	0.005	206	0.005	169	0.016	56	0.011	225
DCP 4	.049	0.801	1.471	349	0.049	348	0.025	19	0.002	10	0.008	352	0.009	176	0.006	332	0.017	83	0.008	198
DCP 5	.074	0.860	1.178	350	0.042	353	0.009	26	0.003	17	0.000	140	0.004	280	0.004	17	0.011	104	0.006	213
DCP 6	.099	0.964	1.001	351	0.038	3	0.006	55	0.006	44	0.005	72	0.002	235	0.005	216	0.016	106	0.003	291
DCP 7	.149	0.641	0.766	352	0.034	11	0.006	67	0.007	353	0.015	84	0.003	87	0.003	36	0.009	355	0.003	45
DCP 8	.200	0.578	0.623	357	0.020	23	0.003	113	0.005	168	0.008	237	0.006	154	0.008	59	0.005	65	0.012	180
DCP 9	.250	0.427	0.529	357	0.024	19	0.007	357	0.009	331	0.007	55	0.007	30	0.005	197	0.022	105	0.002	331
DCP10	.300	0.496	0.445	358	0.023	15	0.006	7	0.002	286	0.006	160	0.008	43	0.006	87	0.009	143	0.005	289
DCP11	.399	0.450	0.355	7	0.020	31	0.007	319	0.009	112	0.009	291	0.008	331	0.008	161	0.023	144	0.002	148
DCP12	.501	0.272	0.280	11	0.016	28	0.003	316	0.004	113	0.004	28	0.007	196	0.009	158	0.015	178	0.003	68
DCP13	.600	0.259	0.211	16	0.013	34	0.012	326	0.009	17	0.001	215	0.013	248	0.003	146	0.013	167	0.006	328
DCP14	.701	0.270	0.152	21	0.015	35	0.007	107	0.005	24	0.003	131	0.006	338	0.016	169	0.021	129	0.003	94
DCP15	.800	0.141	0.095	29	0.008	87	0.002	297	0.004	238	0.005	290	0.003	45	0.003	159	0.021	126	0.003	346
DCP16	.900	-0.059	0.033	65	0.011	157	0.005	263	0.009	298	0.007	11	0.011	295	0.005	265	0.024	128	0.016	90
DCP17	.969	0.008	0.030	161	0.008	257	0.009	21	0.010	183	0.011	152	0.010	287	0.006	198	0.015	141	0.008	29

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.21	0.174	0.199	4.87	0.0	4.97	12001.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
67.8 (222.4)	11913. (248.2)	0.32E 07	-0.039	1.013	9.78	-0.00149	0.830	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.973	4.873	0	0.226	5	0.040	265	0.094	270	0.016	40	0.006	22	0.027	185	0.004	96	0.005	18
CN		0.600	0.412	358	0.019	14	0.004	87	0.002	39	0.003	349	0.001	290	0.003	32	0.008	11	0.004	216
CM		-0.011	0.020	294	0.002	257	0.001	296	0.001	195	0.001	227	0.000	65	0.001	246	0.002	219	0.001	47
DCP 1	.010	2.621	2.807	346	0.124	321	0.044	137	0.025	72	0.011	284	0.009	58	0.015	302	0.017	307	0.014	180
DCP 2	.020	1.975	2.176	349	0.090	355	0.008	56	0.002	50	0.008	280	0.002	72	0.016	318	0.024	339	0.015	235
DCP 3	.030	2.022	1.856	349	0.083	357	0.007	353	0.007	79	0.001	24	0.002	342	0.009	314	0.019	342	0.004	188
DCP 4	.049	1.697	1.518	349	0.066	355	0.002	321	0.006	72	0.002	233	0.002	307	0.001	139	0.010	349	0.002	121
DCP 5	.074	1.584	1.203	350	0.054	357	0.009	35	0.008	137	0.012	343	0.005	215	0.006	224	0.014	329	0.001	322
DCP 6	.099	1.548	1.012	352	0.042	3	0.007	345	0.007	114	0.007	347	0.004	211	0.006	216	0.013	323	0.006	81
DCP 7	.149	1.093	0.769	353	0.028	351	0.013	358	0.002	139	0.009	354	0.004	25	0.009	235	0.019	315	0.003	117
DCP 8	.200	0.921	0.638	358	0.026	2	0.009	126	0.007	236	0.002	170	0.003	115	0.011	301	0.013	22	0.010	205
DCP 9	.250	0.734	0.534	358	0.021	13	0.008	73	0.006	225	0.011	273	0.004	134	0.007	336	0.011	35	0.010	225
DCP10	.300	0.748	0.448	359	0.017	37	0.004	10	0.001	147	0.009	211	0.002	229	0.008	65	0.008	349	0.007	172
DCP11	.399	0.653	0.365	7	0.021	50	0.006	141	0.006	67	0.004	239	0.009	1	0.009	11	0.011	51	0.006	245
DCP12	.501	0.431	0.276	10	0.021	37	0.007	84	0.004	302	0.004	359	0.004	302	0.004	67	0.006	40	0.002	172
DCP13	.600	0.362	0.208	17	0.019	29	0.006	133	0.001	339	0.010	22	0.006	270	0.005	71	0.017	20	0.001	73
DCP14	.701	0.354	0.141	26	0.019	24	0.011	39	0.005	39	0.011	5	0.002	335	0.007	44	0.003	31	0.009	327
DCP15	.800	0.189	0.089	39	0.009	50	0.002	304	0.004	313	0.005	8	0.002	205	0.004	78	0.011	20	0.006	235
DCP16	.900	-0.037	0.040	35	0.004	238	0.012	135	0.017	45	0.008	170	0.008	135	0.002	297	0.003	22	0.007	183
DCP17	.969	-0.013	0.010	135	0.005	213	0.008	149	0.004	326	0.007	95	0.007	266	0.012	93	0.006	45	0.019	208

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.175	0.199	4.87	0.0	7.47	12001.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.5 (221.4)	11826. (247.0)	0.32E 07	-0.041	1.225	12.29	-0.00171	0.943	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.474	4.873	0	0.220	6	0.041	260	0.002	237	0.018	50	0.005	344	0.026	193	0.003	76	0.003	6
CN		0.833	0.401	0	0.017	31	0.006	117	0.004	312	0.001	268	0.003	245	0.002	291	0.011	343	0.005	107
CM		-0.008	0.022	290	0.003	332	0.004	316	0.002	107	0.000	225	0.001	32	0.001	141	0.005	178	0.002	282
DCP 1	.010	4.008	2.412	346	-.282	46	0.189	331	0.080	228	0.054	283	0.063	207	0.033	147	0.021	195	0.033	78
DCP 2	.020	3.213	2.115	35.	0.093	358	0.008	357	0.012	228	0.015	303	0.006	247	0.008	213	0.020	221	0.007	68
DCP 3	.030	3.055	1.816	350	0.074	351	0.008	71	0.011	230	0.011	313	0.007	209	0.008	244	0.012	218	0.010	192
DCP 4	.049	2.579	1.499	350	0.070	2	0.011	5	0.014	65	0.002	201	0.007	13	0.008	210	0.013	230	0.007	230
DCP 5	.074	2.281	1.182	351	0.051	0	0.010	29	0.007	71	0.004	252	0.005	334	0.005	172	0.012	268	0.003	173
DCP 6	.099	2.107	0.998	352	0.046	358	0.009	33	0.006	100	0.001	256	0.005	6	0.006	208	0.015	276	0.002	46
DCP 7	.149	1.526	0.767	354	0.038	10	0.002	251	0.019	33	0.009	10	0.005	188	0.005	194	0.010	238	0.002	114
DCP 8	.200	1.276	0.621	359	0.030	14	0.004	284	0.005	9	0.004	264	0.008	331	0.004	22	0.011	262	0.003	316
DCP 9	.250	1.045	0.515	359	0.021	38	0.013	92	0.012	10	0.009	106	0.002	191	0.003	49	0.013	350	0.004	94
DCP10	.300	1.000	0.4 5	1	0.022	14	0.008	186	0.009	316	0.007	206	0.006	278	0.006	221	0.010	355	0.005	225
DCP11	.399	0.854	0.356	4	0.014	53	0.015	157	0.001	21	0.007	208	0.008	246	0.002	336	0.010	252	0.011	132
DCP12	.501	0.564	0.269	13	0.012	46	0.010	115	0.006	333	0.008	246	0.007	255	0.008	340	0.013	347	0.003	126
DCP13	.600	0.465	0.213	19	0.015	80	0.014	152	0.004	145	0.005	229	0.011	268	0.008	314	0.021	359	0.009	25
DCP14	.701	0.410	0.161	34	0.014	92	0.009	105	0.012	274	0.004	36	0.006	118	0.003	91	0.017	39	0.009	127
DCP15	.800	0.236	0.094	46	0.006	85	0.018	141	0.008	312	0.006	174	0.004	352	0.009	180	0.016	338	0.004	52
DCP16	.900	0.015	0.051	52	0.012	179	0.011	183	0.015	265	0.011	33	0.010	191	0.020	326	0.027	341	0.021	126
DCP17	.969	0.009	0.013	85	0.007	22	0.013	144	0.005	52	0.011	1	0.005	73	0.002	183	0.015	357	0.012	73

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.24	0.175	0.99	4.87	0.0	9.95	12001.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.8 (222.4)	11879. (248.1)	0.32E 07	-0.026	1.439	14.87	-0.00170	0.944	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.[illegible]	[illegible]		[illegible]		[illegible]		0.014	277	0.024	59	[illegible]		[illegible]		[illegible]		0.006	14
CN		[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	357	0.002	287	[illegible]		[illegible]		[illegible]		[illegible]	75
CM		[illegible]	0.023	293	[illegible]		[illegible]		0.000	122	0.001	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	239
DCP 1	.010	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		0.062	44	0.032		[illegible]	27	[illegible]		[illegible]	347
DCP 2	.020	4.[illegible]	2.040	35[illegible]	0.094	359	0.021	336	0.009	2	0.007	180	0.010		0.013	45[illegible]	[illegible]		0.006	47
DCP 3	.030	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
DCP 4	.049	3.[illegible]	1.[illegible]	353	0.093	359	0.004	212	0.010	52	0.007	22	0.008	42	0.007	254	0.016	166	0.002	289
DCP 5	.074	2.692	1.133	354	0.073	358	0.006	243	0.002	330	0.002	7	0.005	5	0.003	287	0.020	152	0.003	99
DCP 6	.099	2.596	0.950	355	0.055	5	0.001	62	0.005	44	0.003	218	0.002	69	0.004	222	0.021	136	0.001	216
DCP 7	.149	1.912	0.723	357	0.041	7	0.005	105	0.010	246	0.012	56	0.007	323	0.004	218	0.015	152	0.005	356
DCP 8	.200	1.587	0.602	2	0.030	1	0.001	90	0.006	64	0.003	264	0.004	5	0.009	193	0.024	189	0.010	323
DCP 9	.250	1.312	0.511	2	0.029	21	0.015	15	0.003	206	0.006	246	0.007	261	0.007	188	0.013	212	0.009	113
DCP10	.300	1.210	0.412	4	0.031	22	0.004	37	0.004	279	0.007	292	0.006	305	0.006	295	0.015	190	0.008	130
DCP11	.399	1.007	0.329	13	0.038	33	0.003	354	0.006	317	0.004	246	0.006	31	0.007	256	0.018	181	0.012	681
DCP12	.501	0.713	0.250	19	0.029	32	0.008	4	0.005	352	0.004	238	0.009	8	0.005	219	0.018	216	0.007	68
DCP13	.600	0.537	0.187	27	0.026	29	0.011	8	0.001	265	0.002	146	0.009	33	0.010	145	0.017	228	0.006	62
DCP14	.701	0.474	0.133	42	0.027	32	0.007	338	0.010	328	0.009	221	0.004	122	0.006	196	0.021	209	0.004	269
DCP15	.800	0.254	0.093	55	0.019	36	0.003	40	0.005	353	0.002	224	0.006	37	0.006	146	0.021	204	0.003	1
DCP16	.900	-0.002	0.057	32	0.003	60	0.003	329	0.008	100	0.003	34	0.001	116	0.015	260	0.014	180	0.018	67
DCP17	.969	-0.013	0.012	63	0.007	317	0.004	263	0.011	279	0.007	187	0.019	9	0.006	255	0.019	212	0.005	334

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.167	0.206	4.84	0.0	12.47	12003.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
70.5 (231.3)	12736. (266.0)	0.33E 07	-0.107	1.611	17.30	-0.00011	0.064	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.473	4.838	0	0.253	5	0.044	237	0.008	53	0.015	357	0.024	124	0.031	218	0.008	198	0.003	54
CN		1.122	0.465	30	0.086	268	0.041	87	0.017	311	0.011	172	0.005	17	0.003	307	0.002	278	0.007	103
CM		-0.027	0.024	182	0.036	0	0.020	217	0.006	89	0.003	332	0.002	180	0.000	303	0.002	35	0.002	286
DCP 1	.010	5.132	1.647	37	0.777	357	0.401	228	0.147	188	0.195	148	0.065	349	0.120	236	0.036	191	0.024	64
DCP 2	.020	4.313	1.767	32	0.634	345	0.218	223	0.051	148	0.077	99	0.081	351	0.059	259	0.022	121	0.044	69
DCP 3	.030	4.199	1.685	28	0.586	326	0.283	188	0.152	56	0.065	290	0.030	225	0.016	137	0.023	8	0.010	23
DCP 4	.049	3.065	1.142	51	0.643	3	0.246	260	0.080	173	0.047	129	0.040	62	0.042	326	0.026	293	0.022	138
DCP 5	.074	2.673	1.022	49	0.525	347	0.208	229	0.058	110	0.017	89	0.022	30	0.026	307	0.010	357	0.002	352
DCP 6	.099	2.565	0.948	45	0.428	333	0.172	199	0.058	74	0.013	57	0.026	339	0.021	253	0.014	20	0.004	141
DCP 7	.149	1.979	0.839	33	0.301	296	0.155	149	0.057	11	0.011	28	0.024	270	0.008	113	0.029	36	0.009	46
DCP 8	.200	1.777	0.794	24	0.269	269	0.161	122	0.074	358	0.021	285	0.021	214	0.010	126	0.018	7	0.005	321
DCP 9	.250	1.535	0.702	19	0.211	246	0.141	93	0.059	339	0.028	283	0.043	181	0.029	69	0.019	349	0.017	240
DCP10	.300	1.349	0.590	19	0.175	235	0.129	72	0.060	305	0.031	226	0.012	118	0.012	14	0.004	290	0.006	196
DCP11	.399	1.132	0.479	24	0.149	221	0.109	62	0.052	294	0.026	187	0.017	80	0.013	322	0.013	231	0.022	100
DCP12	.501	0.857	0.388	24	0.138	213	0.100	55	0.033	288	0.025	187	0.015	78	0.011	295	0.007	202	0.014	105
DCP13	.600	0.726	0.306	29	0.118	204	0.081	47	0.023	272	0.016	194	0.015	60	0.008	333	0.010	204	0.006	86
DCP14	.701	0.550	0.219	38	0.105	192	0.065	37	0.022	241	0.015	139	0.022	356	0.005	81	0.006	191	0.017	85
DCP15	.800	0.333	0.146	24	0.097	176	0.052	11	0.014	221	0.016	117	0.016	336	0.005	127	0.007	221	0.007	100
DCP16	.900	0.078	0.116	2	0.060	164	0.023	38	0.008	280	0.021	107	0.004	299	0.007	139	0.006	209	0.009	148
DCP17	.969	0.034	0.065	347	0.033	160	0.018	19	0.009	282	0.006	284	0.018	281	0.018	228	0.006	331	0.006	301

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.172	0.200	4.82	0.0	14.95	12003.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.0 (223.1)	11989. (250.4)	0.32E 07	-0.320	2.216	19.75	0.00094	-0.526	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.954	4.817	0	0.258	13	0.045	288	0.036	253	0.040	109	0.041	347	0.013	181	0.010	133	0.005	234
CN		1.277	0.574	44	0.196	307	0.119	207	0.087	110	0.056	18	0.036	284	0.019	192	0.028	57	0.006	340
CM		-0.052	0.087	176	0.069	52	0.039	333	0.031	241	0.019	147	0.015	49	0.007	326	0.011	235	0.006	138
DCP 1	.010	4.952	2.052	112	1.094	28	0.283	30	0.415	337	0.220	331	0.205	281	0.159	206	0.134	142	0.087	100
DCP 2	.020	4.235	1.854	93	1.015	25	0.157	353	0.150	320	0.073	318	0.120	276	0.111	213	0.102	141	0.078	100
DCP 3	.030	4.167	1.739	84	1.027	17	0.305	310	0.246	253	0.147	159	0.065	92	0.056	49	0.064	348	0.036	268
DCP 4	.049	3.449	1.203	83	0.787	32	0.317	308	0.111	211	0.047	49	0.068	284	0.058	178	0.037	82	0.033	66
DCP 5	.074	3.033	1.146	76	0.686	12	0.278	280	0.118	194	0.036	100	0.011	274	0.026	132	0.038	54	0.026	23
DCP 6	.099	2.853	1.097	70	0.603	357	0.241	263	0.126	194	0.072	115	0.023	48	0.027	94	0.033	39	0.019	351
DCP 7	.149	2.196	0.992	58	0.487	337	0.221	255	0.168	189	0.094	109	0.048	28	0.029	75	0.051	14	0.045	306
DCP 8	.200	1.958	0.916	49	0.415	330	0.245	257	0.195	183	0.097	112	0.050	55	0.030	42	0.074	12	0.037	291
DCP 9	.250	1.713	0.842	39	0.350	311	0.251	236	0.226	151	0.144	74	0.108	10	0.050	303	0.067	307	0.067	209
DCP10	.300	1.574	0.769	35	0.321	299	0.238	223	0.220	136	0.140	52	0.099	345	0.071	279	0.048	251	0.044	155
DCP11	.399	1.345	0.710	33	0.307	285	0.224	210	0.208	121	0.145	42	0.111	330	0.079	256	0.036	173	0.062	120
DCP12	.501	1.029	0.616	28	0.270	269	0.201	192	0.194	100	0.124	13	0.090	295	0.056	224	0.055	135	0.038	78
DCP13	.600	0.864	0.530	24	0.267	252	0.179	170	0.170	78	0.126	348	0.098	264	0.068	182	0.069	89	0.036	20
DCP14	.701	0.687	0.418	19	0.257	238	0.184	151	0.162	53	0.106	319	0.100	221	0.058	133	0.072	67	0.056	332
DCP15	.800	0.442	0.325	7	0.215	230	0.158	137	0.129	31	0.096	298	0.088	196	0.051	99	0.079	30	0.047	279
DCP16	.900	0.149	0.223	3	0.092	227	0.088	136	0.066	14	0.053	281	0.044	194	0.031	130	0.051	25	0.038	299
DCP17	.969	0.066	0.110	350	0.047	254	0.034	125	0.025	39	0.014	286	0.029	199	0.025	33	0.027	21	0.011	310

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.96	0.174	0.197	4.81	0.0	17.44	12003.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.1 (220.1)	11702. (244.4)	0.32E 07	-0.409	2.446	21.61	0.00045	-0.250	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.441	4.808	0	0.212	11	0.013	278	0.046	0	0.046	264	0.057	120	0.033	183	0.007	33	0.015	307
CN		1.328	0.647	55	0.186	345	0.111	303	0.129	235	0.099	143	0.048	56	0.016	328	0.015	211	0.008	265
CM		-0.078	0.125	180	0.065	99	0.044	47	0.041	351	0.036	270	0.021	185	0.008	124	0.006	73	0.005	47
DCP 1	.010	4.473	2.591	121	0.510	99	0.692	71	0.176	107	0.231	96	0.256	88	0.171	36	0.140	9	0.115	351
DCP 2	.020	3.987	2.345	110	0.606	83	0.559	55	0.150	332	0.031	214	0.114	105	0.062	65	0.043	34	0.039	25
DCP 3	.030	3.936	2.120	106	0.706	68	0.615	46	0.359	335	0.171	299	0.102	271	0.098	246	0.131	212	0.093	173
DCP 4	.049	3.421	1.545	109	0.804	60	0.317	21	0.233	325	0.145	235	0.098	99	0.050	334	0.031	218	0.029	280
DCP 5	.074	3.008	1.391	99	0.622	48	0.128	16	0.286	311	0.152	224	0.037	103	0.035	281	0.041	217	0.035	209
DCP 6	.099	2.810	1.273	90	0.491	41	0.355	10	0.307	297	0.140	222	0.016	165	0.036	254	0.071	208	0.042	169
DCP 7	.149	2.208	1.142	73	0.362	28	0.359	350	0.278	282	0.148	217	0.032	161	0.062	243	0.079	193	0.047	142
DCP 8	.200	1.980	1.012	66	0.368	25	0.332	346	0.284	290	0.169	229	0.045	195	0.064	230	0.087	194	0.044	144
DCP 9	.250	1.747	0.931	56	0.328	5	0.303	321	0.294	263	0.217	201	0.105	155	0.061	142	0.100	129	0.056	56
DCP10	.300	1.624	0.844	48	0.307	353	0.258	308	0.274	252	0.225	177	0.093	127	0.070	111	0.091	79	0.065	13
DCP11	.399	1.439	0.799	43	0.309	339	0.246	291	0.265	244	0.235	166	0.133	110	0.090	77	0.057	45	0.084	351
DCP12	.501	1.137	0.730	34	0.279	316	0.213	266	0.233	216	0.217	137	0.131	76	0.080	24	0.047	341	0.076	297
DCP13	.600	0.948	0.686	27	0.293	297	0.218	239	0.214	189	0.216	113	0.139	41	0.089	342	0.060	290	0.072	258
DCP14	.701	0.774	0.585	20	0.266	281	0.182	223	0.204	171	0.201	87	0.145	9	0.091	304	0.079	245	0.058	195
DCP15	.800	0.527	0.429	10	0.201	276	0.129	214	0.152	162	0.154	71	0.118	345	0.076	280	0.072	227	0.064	162
DCP16	.900	0.245	0.293	0	0.153	270	0.070	203	0.099	145	0.102	47	0.076	318	0.029	215	0.014	171	0.022	167
DCP17	.969	0.127	0.184	359	0.121	276	0.070	191	0.075	101	0.068	23	0.057	292	0.057	188	0.035	185	0.039	10

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.23	0.175	0.199	4.80	0.0	19.94	12003.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.5 (221.4)	11865. (247.8)	0.32E 07	-0.383	2.220	22.92	-0.00230	1.275	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.944	4.796	0	0.205	12	0.025	224	0.029	80	0.061	11	0.044	245	0.022	212	0.012	89	0.003	356
CN		1.280	0.605	60	0.091	39	0.106	21	0.115	318	0.088	242	0.033	167	0.028	77	0.010	329	0.004	322
CM		-0.106	0.126	194	0.044	138	0.032	128	0.035	76	0.027	11	0.017	299	0.012	259	0.004	225	0.003	236
DCP 1	.010	3.335	1.803	113	0.739	148	0.282	145	0.128	167	0.218	231	0.212	189	0.139	157	0.093	152	0.087	137
DCP 2	.020	3.100	1.755	107	0.619	134	0.248	112	0.116	38	0.123	286	0.117	226	0.054	187	0.074	188	0.073	189
DCP 3	.030	3.147	1.589	108	0.606	124	0.387	91	0.259	46	0.096	11	0.040	347	0.078	33	0.054	0	0.031	327
DCP 4	.049	3.096	1.509	123	0.516	105	0.378	106	0.255	38	0.039	335	0.016	341	0.046	45	0.041	326	0.030	299
DCP 5	.074	2.725	1.263	110	0.353	103	0.336	88	0.234	20	0.072	331	0.035	314	0.052	33	0.042	332	0.029	335
DCP 6	.099	2.515	1.092	98	0.306	103	0.301	73	0.233	13	0.098	325	0.040	321	0.069	16	0.046	337	0.036	350
DCP 7	.149	2.012	0.931	78	0.310	94	0.249	57	0.250	13	0.106	307	0.016	304	0.060	16	0.038	349	0.056	328
DCP 8	.200	1.841	0.833	73	0.252	80	0.250	55	0.242	10	0.126	310	0.038	308	0.052	7	0.048	343	0.048	318
DCP 9	.250	1.674	0.789	66	0.197	56	0.234	34	0.239	350	0.173	290	0.068	272	0.040	317	0.052	277	0.061	271
DCP10	.300	1.596	0.742	59	0.180	34	0.220	25	0.238	336	0.195	273	0.105	246	0.049	241	0.054	255	0.036	216
DCP11	.399	1.445	0.737	52	0.161	18	0.179	17	0.219	325	0.195	266	0.094	234	0.049	197	0.049	227	0.049	187
DCP12	.501	1.176	0.697	42	0.144	354	0.153	354	0.184	302	0.175	241	0.092	187	0.067	147	0.031	193	0.038	150
DCP13	.600	0.997	0.701	34	0.188	338	0.146	329	0.191	277	0.175	213	0.113	155	0.084	109	0.030	101	0.029	98
DCP14	.701	0.855	0.619	26	0.191	323	0.142	309	0.184	253	0.163	188	0.117	125	0.091	80	0.040	45	0.052	33
DCP15	.800	0.617	0.476	22	0.126	317	0.120	308	0.140	248	0.123	175	0.113	107	0.097	63	0.064	16	0.053	337
DCP16	.900	0.308	0.304	21	0.076	298	0.064	291	0.066	234	0.062	141	0.062	65	0.037	26	0.020	47	0.014	78
DCP17	.969	0.136	0.186	23	0.077	295	0.057	249	0.068	188	0.061	112	0.057	38	0.048	332	0.018	242	0.021	176

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.86	0.333	0.205	5.21	0.0	0.38	12005.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
70.2 (230.3)	12669. (264.6)	0.33E 07	-0.076	0.491	5.30	-0.00146	0.873	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.075	5.208 0	0.284 3	0.066 326	0.028 189	0.036 104	0.025 65	0.015 217	0.008 267	0.011 161
CN		0.143	0.358 16	0.025 48	0.008 72	0.021 61	0.012 288	0.002 322	0.006 278	0.009 256	0.003 142
CM		-0.026	0.040 289	0.004 282	0.003 286	0.012 233	0.003 126	0.002 138	0.002 162	0.004 36	0.001 303
DCP 1	.010	-0.587	2.609 346	0.167 14	0.021 47	0.075 193	0.006 223	0.015 186	0.029 227	0.013 51	0.006 166
DCP 2	.020	-0.437	1.890 352	0.075 353	0.016 345	0.070 211	0.009 239	0.015 209	0.016 234	0.026 8	0.008 221
DCP 3	.030	0.015	1.597 352	0.070 344	0.020 342	0.038 223	0.010 221	0.009 298	0.009 284	0.013 343	0.008 171
DCP 4	.049	-0.061	1.284 353	0.064 0	0.028 325	0.038 202	0.018 266	0.014 36	0.013 153	0.006 327	0.006 256
DCP 5	.074	0.159	1.030 355	0.054 2	0.013 20	0.033 213	0.007 272	0.006 203	0.003 154	0.012 7	0.004 177
DCP 6	.099	0.395	0.883 358	0.046 22	0.011 67	0.031 193	0.014 285	0.002 329	0.007 135	0.012 338	0.004 25
DCP 7	.149	0.213	0.661 4	0.051 30	0.014 29	0.030 190	0.009 298	0.016 126	0.003 94	0.015 316	0.007 152
DCP 8	.200	0.223	0.534 12	0.036 45	0.012 8	0.027 221	0.001 179	0.008 232	0.007 335	0.010 77	0.003 228
DCP 9	.250	0.175	0.489 13	0.027 33	0.021 63	0.022 31	0.020 270	0.005 115	0.006 26	0.012 354	0.005 151
DCP10	.300	0.220	0.402 16	0.033 64	0.006 66	0.031 41	0.009 284	0.013 105	0.009 231	0.012 292	0.010 87
DCP11	.399	0.259	0.341 33	0.031 92	0.007 90	0.042 52	0.015 260	0.005 340	0.008 330	0.027 295	0.008 127
DCP12	.501	0.144	0.293 43	0.032 56	0.003 129	0.027 48	0.013 272	0.004 272	0.005 330	0.028 255	0.004 214
DCP13	.600	0.187	0.249 51	0.028 46	0.017 61	0.031 69	0.011 254	0.008 291	0.008 264	0.019 246	0.004 43
DCP14	.701	0.221	0.187 59	0.012 128	0.017 138	0.042 52	0.022 319	0.005 301	0.012 294	0.031 186	0.009 240
DCP15	.800	0.118	0.136 71	0.016 98	0.014 119	0.038 59	0.022 296	0.011 11	0.003 144	0.017 153	0.006 205
DCP16	.900	-0.074	0.081 95	0.017 67	0.014 77	0.052 43	0.011 295	0.013 321	0.019 330	0.005 193	0.008 106
DCP17	.969	0.023	0.036 136	0.009 120	0.004 16	0.043 58	0.017 15	0.011 206	0.010 230	0.023 267	0.014 58

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	46.00	0.344	0.200	5.20	0.0	2.48	12005.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.2 (223.6)	12051. (251.7)	0.32E 07	-0.066	0.698	7.70	-0.00142	0.828	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.484	5.204 0	0.288 2	0.081 319	0.019 260	0.038 108	0.029 62	0.029 194	0.025 246	0.013 157
CN		0.363	0.365 15	0.024 47	0.011 65	0.022 8	0.001 256	0.001 159	0.001 223	0.010 170	0.005 236
CM		-0.020	0.039 290	0.005 300	0.003 291	0.011 198	0.001 236	0.001 159	0.001 30	0.003 310	0.003 71
DCP 1	.010	0.957	2.499 346	0.159 1	0.031 14	0.043 218	0.015 257	0.010 227	0.009 357	0.034 218	0.013 40
DCP 2	.020	0.684	1.962 352	0.109 3	0.044 352	0.053 227	0.003 153	0.009 228	0.008 178	0.034 253	0.015 61
DCP 3	.030	0.968	1.646 352	0.086 3	0.036 354	0.040 230	0.012 138	0.008 197	0.003 205	0.026 248	0.006 46
DCP 4	.049	0.733	1.323 354	0.074 349	0.031 14	0.032 216	0.008 231	0.004 335	0.010 209	0.016 199	0.011 89
DCP 5	.074	0.814	1.068 355	0.061 8	0.025 354	0.023 207	0.009 146	0.015 193	0.007 51	0.010 151	0.007 9
DCP 6	.099	0.957	0.897 358	0.057 19	0.028 12	0.031 219	0.008 211	0.015 176	0.001 206	0.022 125	0.010 71
DCP 7	.149	0.625	0.680 2	0.036 10	0.014 44	0.027 215	0.013 43	0.006 197	0.013 18	0.006 304	0.014 53
DCP 8	.200	0.557	0.557 12	0.032 38	0.018 91	0.025 221	0.009 270	0.008 284	0.007 207	0.022 278	0.008 69
DCP 9	.250	0.455	0.485 13	0.031 22	0.010 49	0.038 356	0.008 261	0.009 88	0.004 337	0.024 256	0.009 112
DCP10	.300	0.485	0.421 16	0.035 27	0.024 67	0.031 354	0.016 241	0.009 183	0.002 49	0.018 212	0.015 233
DCP11	.399	0.450	0.354 31	0.028 63	0.017 89	0.040 19	0.011 223	0.014 139	0.014 30	0.017 170	0.011 187
DCP12	.501	0.284	0.284 41	0.032 74	0.007 97	0.042 32	0.007 258	0.011 88	0.012 205	0.018 161	0.012 203
DCP13	.600	0.291	0.236 53	0.037 90	0.010 77	0.042 19	0.008 321	0.010 54	0.009 82	0.029 133	0.012 252
DCP14	.701	0.292	0.201 59	0.026 102	0.011 74	0.044 20	0.013 77	0.007 310	0.010 289	0.021 146	0.016 260
DCP15	.800	0.145	0.140 73	0.020 99	0.016 87	0.036 20	0.002 7	0.014 325	0.008 242	0.013 98	0.014 264
DCP16	.900	-0.067	0.066 90	0.010 225	0.010 153	0.039 349	0.012 101	0.013 231	0.011 207	0.014 15	0.004 246
DCP17	.969	0.010	0.016 151	0.007 126	0.003 109	0.026 34	0.015 29	0.008 21	0.012 156	0.017 221	0.009 286

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	46.05	0.349	0.198	5.20	0.0	5.01	12005.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.2 (220.5)	11745. (245.3)	0.32E 07	-0.062	0.960	17.26	-0.00147	0.843	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		5.006	5.199 0	0.293 3	0.090 308	0.019 190	0.036 96	0.027 63	0.019 215	0.021 244	0.009 140
CN		0.587	0.366 16	0.022 41	0.008 55	0.018 119	0.005 281	0.005 20	0.004 29	0.009 146	0.003 198
CM		-0.012	0.042 292	0.003 297	0.001 311	0.007 337	0.001 106	0.002 182	0.002 212	0.004 292	0.001 15
DCP 1	.010	2.542	2.519 347	0.116 335	0.022 [illegible]	0.011 40	0.016 183	0.013 2	0.007 237	0.016 225	0.005 80
DCP 2	.020	1.886	1.942 352	0.108 5	0.019 [illegible]	0.032 47	0.013 183	0.024 63	0.019 271	0.014 224	0.004 176
DCP 3	.030	1.998	1.655 352	0.091 9	0.018 [illegible]	0.046 47	0.012 186	0.019 30	0.012 262	0.005 325	0.006 182
DCP 4	.049	1.593	1.360 354	0.069 12	0.028 [illegible]	0.035 27	0.008 186	0.004 305	0.009 269	0.015 265	0.014 280
DCP 5	.074	1.500	1.079 356	0.063 9	0.016 6	0.039 31	0.004 241	0.005 67	0.003 88	0.009 134	0.002 331
DCP 6	.099	1.518	0.910 359	0.056 16	0.027 33	0.030 32	0.011 178	0.015 356	0.005 137	0.015 95	0.002 338
DCP 7	.149	1.052	0.676 3	0.040 22	0.014 31	0.027 44	0.008 284	0.006 103	0.007 98	0.010 235	0.011 172
DCP 8	.200	0.914	0.577 11	0.035 66	0.020 12	0.041 38	0.009 52	0.009 117	0.007 294	0.009 69	0.014 242
DCP 9	.250	0.746	0.494 13	0.026 32	0.015 58	0.029 129	0.017 260	0.009 149	0.005 136	0.022 235	0.012 144
DCP10	.300	0.731	0.425 19	0.030 33	0.023 5[illegible]	0.015 121	0.011 344	0.005 93	0.016 355	0.019 200	0.007 88
DCP11	.399	0.656	0.351 34	0.033 62	0.010 55	0.028 136	0.010 339	0.002 103	0.019 66	0.021 230	0.006 14
DCP12	.501	0.418	0.295 42	0.029 84	0.00[illegible] 87	0.021 168	0.006 266	0.007 345	0.005 225	0.015 173	0.007 230
DCP13	.600	0.375	0.247 52	0.014 69	0.003 24	0.030 148	0.013 273	0.019 356	0.010 52	0.013 147	0.013 218
DCP14	.701	0.353	0.189 61	0.014 56	0.014 153	0.017 160	0.016 284	0.007 318	0.009 315	0.031 103	0.013 183
DCP15	.800	0.173	0.142 78	0.013 102	0.002 140	0.025 142	0.003 255	0.003 159	0.011 19	0.022 77	0.003 27
DCP16	.900	-0.051	0.084 101	0.003 118	0.013 137	0.039 134	0.003 117	0.008 13	0.003 167	0.024 74	0.013 147
DCP17	.969	-0.015	0.031 155	0.010 263	0.012 14	0.024 181	0.006 118	0.017 27	0.015 48	0.026 190	0.022 337

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.99	0.352	0.196	5.20	0.0	7.51	12005.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
66.5 (218.3)	11558. (241.4)	0.32E 07	-0.069	1.218	12.78	-0.00153	0.872	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.509	5.200 0	0.305 3	0.088 305	0.014 108	0.040 98	0.026 52	0.025 217	0.022 270	0.010 129
CN		0.823	0.363 18	0.030 44	0.008 44	0.040 113	0.005 293	0.009 313	0.005 234	0.010 224	0.001 154
CM		-0.008	0.043 291	0.004 281	0.003 293	0.012 305	0.001 174	0.003 140	0.001 51	0.003 357	0.000 216
DCP 1	.010	3.974	2.255 346	0.258 39	0.202 330	0.042 223	0.038 252	0.070 191	0.035 129	0.018 127	0.016 108
DCP 2	.020	3.127	1.931 353	0.111 358	0.035 359	0.034 80	0.018 273	0.013 215	0.020 222	0.012 27	0.020 236
DCP 3	.030	3.026	1.674 353	0.094 354	0.024 12	0.029 93	0.002 271	0.008 152	0.018 254	0.014 6	0.011 213
DCP 4	.049	2.480	1.362 355	0.077 5	0.023 11	0.034 62	0.010 226	0.007 339	0.003 320	0.009 314	0.010 242
DCP 5	.074	2.219	1.092 356	0.069 7	0.018 342	0.037 86	0.013 281	0.011 306	0.010 281	0.013 254	0.010 231
DCP 6	.099	2.094	0.912 0	0.063 21	0.016 332	0.045 74	0.003 178	0.010 307	0.009 265	0.018 281	0.016 295
DCP 7	.149	1.492	0.700 2	0.051 23	0.012 22	0.031 57	0.005 10	0.006 225	0.014 199	0.017 280	0.005 32
DCP 8	.200	1.252	0.568 13	0.035 37	0.015 49	0.034 92	0.015 290	0.007 192	0.003 340	0.010 95	0.017 236
DCP 9	.250	1.043	0.486 15	0.041 32	0.008 156	0.039 102	0.009 249	0.017 304	0.012 232	0.027 319	0.007 107
DCP10	.300	0.991	0.418 18	0.035 46	0.020 6	0.040 95	0.011 220	0.009 49	0.005 283	0.021 270	0.012 354
DCP11	.399	0.861	0.354 37	0.039 63	0.003 88	0.036 132	0.011 321	0.009 315	0.004 268	0.026 278	0.013 85
DCP12	.501	0.560	0.284 44	0.034 74	0.011 62	0.043 121	0.011 0	0.019 327	0.007 265	0.026 220	0.011 143
DCP13	.600	0.481	0.245 55	0.022 82	0.008 26	0.052 114	0.012 255	0.029 324	0.007 197	0.039 211	0.009 138
DCP14	.701	0.437	0.202 67	0.021 57	0.021 105	0.039 135	0.006 333	0.007 322	0.005 76	0.028 172	0.008 226
DCP15	.800	0.217	0.149 92	0.017 99	0.016 69	0.037 124	0.009 322	0.016 258	0.004 189	0.024 126	0.005 81
DCP16	.900	-0.024	0.084 88	0.012 61	0.013 160	0.070 117	0.012 127	0.016 309	0.009 210	0.018 111	0.013 11
DCP17	.969	-0.021	0.008 115	0.005 16	0.011 128	0.036 125	0.005 50	0.014 50	0.018 270	0.024 317	0.018 285

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	46.03	0.353	0.196	5.20	0.0	10.01	12005.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
66.4 (217.8)	11515. (240.5)	0.32E 07	-0.060	1.408	15.18	-0.00159	0.905	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.007	5.200	0	0.281	7	0.101	300	0.035	102	0.032	91	0.023	75	0.032	241	0.012	216	0.008	216
CN		1.029	0.354	20	0.033	47	0.006	35	0.046	134	0.004	294	0.001	353	0.006	322	0.009	21	0.001	196
CM		-0.001	0.044	290	0.004	293	0.000	287	0.013	329	0.002	137	0.000	129	0.002	143	0.004	177	0.001	357
DCP 1	.010	5.217	1.956	347	0.246	31	0.109	139	0.186	52	0.066	112	0.099	14	0.022	42	0.021	338	0.004	192
DCP 2	.020	4.278	1.902	354	0.113	13	0.031	323	0.076	100	0.023	173	0.019	49	0.009	193	0.020	138	0.002	127
DCP 3	.030	4.000	1.649	353	0.090	4	0.033	321	0.060	103	0.012	138	0.003	66	0.004	242	0.014	100	0.010	189
DCP 4	.049	3.294	1.331	356	0.087	13	0.026	26	0.036	111	0.007	249	0.001	337	0.008	186	0.009	100	0.006	206
DCP 5	.074	2.856	1.057	358	0.078	18	0.015	15	0.036	106	0.010	162	0.008	288	0.001	229	0.007	29	0.004	354
DCP 6	.099	2.606	0.888	0	0.075	28	0.019	3	0.043	106	0.008	223	0.009	300	0.003	205	0.010	282	0.003	189
DCP 7	.149	1.910	0.669	5	0.062	27	0.013	4	0.035	135	0.007	341	0.004	252	0.002	116	0.020	6	0.008	313
DCP 8	.200	1.583	0.547	14	0.043	48	0.013	28	0.032	116	0.010	162	0.004	20	0.002	76	0.012	142	0.011	125
DCP 9	.250	1.323	0.491	17	0.032	42	0.009	18	0.057	128	0.010	231	0.006	61	0.013	304	0.011	173	0.008	155
DCP10	.300	1.203	0.401	21	0.045	31	0.012	355	0.053	128	0.009	283	0.010	239	0.005	355	0.013	123	0.010	359
DCP11	.399	1.027	0.346	38	0.032	59	0.014	51	0.054	136	0.013	278	0.008	143	0.002	17	0.012	82	0.009	322
DCP12	.501	0.710	0.286	46	0.037	75	0.009	56	0.049	149	0.005	354	0.004	188	0.015	322	0.015	35	0.007	273
DCP13	.600	0.562	0.237	58	0.032	81	0.003	63	0.052	144	0.009	41	0.007	161	0.006	297	0.017	36	0.008	146
DCP14	.701	0.482	0.203	71	0.025	84	0.008	87	0.055	145	0.008	311	0.004	167	0.014	313	0.014	1	0.015	174
DCP15	.800	0.248	0.157	79	0.018	90	0.002	168	0.054	139	0.012	297	0.007	157	0.009	344	0.015	5	0.005	143
DCP16	.900	-0.009	0.086	87	0.009	125	0.006	186	0.049	154	0.008	46	0.019	3	0.013	344	0.045	326	0.003	299
DCP17	.969	-0.017	0.039	104	0.004	1	0.008	324	0.037	139	0.020	276	0.016	305	0.007	244	0.013	124	0.009	0

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	46.03	0.353	0.196	5.20	0.0	12.48	12005.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
66.4 (218.0)	11558. (241.4)	0.32E 07	-0.048	1.571	17.74	-0.00121	0.689	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.478	5.195	0	0.304	2	0.079	297	0.031	74	0.037	85	0.016	57	0.030	223	0.012	271	0.007	115
CN		1.163	0.410	20	0.034	85	0.006	54	0.036	102	0.007	293	0.002	264	0.007	263	0.007	252	0.005	108
CM		0.002	0.031	283	0.016	281	0.001	76	0.008	284	0.002	161	0.001	183	0.002	118	0.003	57	0.002	285
DCP 1	.010	5.715	1.588	13	0.675	336	0.354	181	0.135	131	0.024	278	0.118	177	0.030	181	0.038	162	0.017	253
DCP 2	.020	4.897	1.726	7	0.375	347	0.126	184	0.115	74	0.039	275	0.005	185	0.008	270	0.021	123	0.006	303
DCP 3	.030	4.710	1.697	357	0.093	347	0.038	47	0.016	123	0.015	111	0.005	298	0.012	179	0.017	124	0.005	150
DCP 4	.049	3.693	1.385	13	0.251	318	0.111	149	0.089	54	0.043	237	0.019	130	0.014	219	0.010	100	0.016	39
DCP 5	.074	3.169	1.154	14	0.183	300	0.110	121	0.061	14	0.034	208	0.010	116	0.007	251	0.014	68	0.011	358
DCP 6	.099	2.865	0.999	15	0.130	285	0.104	93	0.028	9	0.035	178	0.010	19	0.012	234	0.015	28	0.014	2
DCP 7	.149	2.165	0.819	12	0.083	215	0.092	52	0.014	215	0.015	126	0.003	315	0.020	205	0.026	12	0.010	163
DCP 8	.200	1.879	0.727	7	0.122	165	0.103	25	0.046	184	0.021	120	0.027	284	0.020	165	0.007	169	0.004	330
DCP 9	.250	1.575	0.568	4	0.140	118	0.100	338	0.067	126	0.019	357	0.025	283	0.010	155	0.037	348	0.021	171
DCP10	.300	1.401	0.463	8	0.116	104	0.074	303	0.071	115	0.036	323	0.021	244	0.009	243	0.019	197	0.006	128
DCP11	.399	1.173	0.374	27	0.101	99	0.036	275	0.070	98	0.[illegible]	298	0.014	95	0.016	333	0.030	269	0.008	175
DCP12	.501	0.798	0.303	37	0.079	91	0.014	249	0.042	84	0.014	231	0.006	75	0.012	305	0.017	261	0.011	71
DCP13	.600	0.604	0.265	48	0.071	98	0.009	245	0.039	88	0.002	231	0.006	18	0.009	316	0.020	276	0.010	98
DCP14	.701	0.496	0.220	64	0.059	82	0.015	147	0.031	110	0.007	279	0.004	251	0.007	296	0.035	208	0.005	100
DCP15	.800	0.253	0.155	70	0.034	93	0.016	148	0.021	123	0.013	5	0.009	95	0.018	254	0.015	170	0.007	66
DCP16	.900	0.009	0.080	71	0.020	68	0.025	83	0.035	92	0.010	7	0.010	307	0.010	19	0.014	115	0.012	115
DCP17	.969	-0.012	0.035	36	0.011	68	0.007	162	0.031	113	0.008	27	0.005	288	0.020	260	0.035	340	0.008	293

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	46.19	0.358	0.198	5.20	0.0	15.02	12005.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
67.1 (220.1)	11779. (246.0)	0.32E 07	-0.206	1.808	19.60	0.00170	-0.972	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.024	5.196	0	0.311	356	0.039	288	0.038	194	0.026	80	0.013	49	0.019	193	0.010	136	0.010	186
CN		1.225	0.621	7	0.195	147	0.053	342	0.027	286	0.021	355	0.025	195	0.015	41	0.014	269	0.009	308
CM		-0.032	0.054	184	0.065	285	0.031	111	0.003	11	0.009	191	0.005	351	0.005	182	0.008	37	0.002	195
DCP 1	.010	4.694	2.152	58	0.563	354	0.422	333	0.445	241	0.198	204	0.143	106	0.077	339	0.107	309	0.026	233
DCP 2	.020	4.192	2.207	43	0.427	327	0.183	2	0.178	250	0.076	178	0.101	106	0.063	8	0.043	299	0.012	169
DCP 3	.030	4.069	2.181	36	0.569	300	0.104	164	0.102	94	0.144	322	0.104	183	0.049	85	0.082	358	0.083	244
DCP 4	.049	3.520	1.792	33	0.510	302	0.169	168	0.042	84	0.078	29	0.072	270	0.054	165	0.025	31	0.004	207
DCP 5	.074	3.083	1.638	28	0.447	275	0.162	137	0.071	66	0.098	352	0.081	240	0.039	132	0.022	51	0.033	0
DCP 6	.099	2.808	1.486	24	0.361	253	0.114	123	0.097	76	0.125	335	0.083	220	0.047	121	0.036	26	0.020	315
DCP 7	.149	2.257	1.362	12	0.380	220	0.116	117	0.138	38	0.097	302	0.086	216	0.061	112	0.040	44	0.055	319
DCP 8	.200	1.971	1.230	7	0.360	210	0.141	118	0.130	23	0.087	306	0.077	199	0.045	90	0.048	24	0.030	312
DCP 9	.250	1.713	1.072	356	0.390	176	0.183	71	0.188	327	0.116	227	0.076	134	0.062	41	0.053	324	0.042	228
DCP10	.300	1.560	0.920	351	0.400	162	0.197	45	0.187	292	0.083	184	0.064	106	0.067	338	0.029	247	0.020	172
DCP11	.399	1.321	0.742	351	0.408	150	0.211	19	0.166	268	0.086	139	0.062	16	0.038	264	0.029	238	0.016	11
DCP12	.501	0.934	0.529	348	0.352	130	0.182	346	0.136	225	0.109	83	0.075	288	0.015	178	0.012	82	0.025	308
DCP13	.600	0.711	0.376	344	0.306	114	0.169	322	0.087	205	0.099	53	0.079	256	0.035	108	0.057	315	0.019	186
DCP14	.701	0.572	0.257	328	0.289	95	0.177	282	0.071	137	0.099	348	0.081	184	0.048	43	0.065	246	0.021	87
DCP15	.800	0.358	0.168	300	0.213	87	0.175	264	0.070	62	0.072	323	0.048	147	0.044	349	0.063	205	0.026	18
DCP16	.900	0.108	0.069	301	0.124	75	0.100	243	0.046	41	0.045	298	0.054	106	0.023	326	0.045	161	0.011	289
DCP17	.969	0.044	0.034	285	0.062	73	0.051	241	0.031	339	0.019	321	0.006	201	0.009	46	0.003	198	0.016	298

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	46.05	0.348	0.199	5.17	0.0	17.50	12005.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
67.3 (220.8)	11874. (248.0)	0.32E 07	-0.351	2.143	22.87	0.00381	-2.189	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.501	5.173	0	0.340	353	0.066	237	0.062	214	0.030	70	0.014	47	0.026	195	0.006	112	0.006	104
CN		1.330	0.751	15	0.182	215	0.060	79	0.040	194	0.026	88	0.015	329	0.010	282	0.005	299	0.005	187
CM		-0.079	0.127	122	0.093	323	0.034	190	0.014	75	0.008	341	0.003	181	0.005	39	0.003	225	0.000	75
DCP 1	.010	4.407	2.628	85	0.600	355	0.366	9	0.081	81	0.284	347	0.158	297	0.152	222	0.124	150	0.074	100
DCP 2	.020	3.986	2.625	71	0.731	346	0.219	315	0.279	180	0.096	70	0.096	9	0.098	300	0.102	225	0.090	160
DCP 3	.030	3.828	2.423	67	0.785	345	0.332	310	0.379	210	0.148	142	0.159	119	0.177	41	0.132	339	0.114	275
DCP 4	.049	3.393	2.148	60	0.813	328	0.272	262	0.330	193	0.200	123	0.101	50	0.084	20	0.078	306	0.042	245
DCP 5	.074	3.009	1.880	53	0.656	314	0.248	248	0.291	177	0.184	105	0.116	36	0.091	2	0.097	278	0.049	201
DCP 6	.099	2.771	1.691	47	0.539	303	0.225	234	0.242	168	0.173	100	0.106	18	0.080	348	0.088	265	0.049	190
DCP 7	.149	2.250	1.553	34	0.552	284	0.279	203	0.228	144	0.182	72	0.095	334	0.074	315	0.067	236	0.025	152
DCP 8	.200	1.988	1.450	29	0.570	276	0.304	185	0.215	146	0.187	56	0.092	315	0.067	303	0.080	189	0.042	145
DCP 9	.250	1.757	1.335	18	0.589	253	0.383	150	0.230	90	0.267	5	0.184	275	0.105	214	0.098	133	0.077	63
DCP10	.300	1.612	1.171	12	0.535	238	0.346	128	0.166	61	0.181	331	0.143	231	0.075	163	0.077	66	0.018	38
DCP11	.399	1.466	1.041	5	0.542	218	0.407	106	0.204	8	0.188	275	0.113	175	0.058	113	0.070	29	0.060	313
DCP12	.501	1.169	0.910	350	0.546	193	0.383	73	0.238	321	0.188	210	0.098	104	0.058	37	0.080	301	0.045	213
DCP13	.600	0.948	0.721	334	0.495	164	0.307	35	0.215	275	0.170	162	0.106	50	0.059	318	0.053	222	0.025	121
DCP14	.701	0.758	0.523	318	0.452	133	0.273	352	0.199	223	0.133	103	0.070	334	0.049	251	0.023	87	0.021	33
DCP15	.800	0.513	0.348	302	0.332	117	0.196	322	0.148	198	0.125	69	0.066	279	0.029	162	0.008	245	0.027	40
DCP16	.900	0.244	0.203	297	0.205	96	0.138	287	0.084	158	0.025	47	0.032	301	0.033	192	0.027	10	0.037	207
DCP17	.969	0.152	0.178	284	0.199	85	0.156	270	0.109	102	0.080	258	0.066	64	0.064	258	0.056	86	0.024	240

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.98	0.347	0.199	5.14	0.0	19.91	12005.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.5 (221.6)	11956. (249.7)	0.32E 07	-0.386	2.295	25.15	0.00338	-1.950	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.910	5.138	0	0.362	359	0.097	257	0.049	276	0.036	74	0.012	88	0.028	189	0.015	286	0.003	72
CN		1.386	0.751	27	0.204	276	0.062	149	0.050	246	0.007	243	0.017	157	0.008	28	0.011	194	0.011	359
CM		-0.116	0.141	142	0.004	5	0.028	256	0.007	154	0.019	125	0.008	345	0.008	142	0.010	21	0.004	195
DCP 1	.010	3.769	2.339	95	0.715	41	0.230	58	0.069	149	0.130	96	0.134	50	0.124	11	0.113	335	0.098	301
DCP 2	.020	3.599	2.309	85	0.802	23	0.280	342	0.240	257	0.121	188	0.060	141	0.062	87	0.062	81	0.061	17
DCP 3	.030	3.535	2.125	85	0.757	19	0.334	0	0.308	283	0.153	246	0.136	202	0.119	175	0.122	143	0.083	96
DCP 4	.049	3.178	2.039	79	0.729	7	0.241	343	0.360	275	0.161	224	0.089	173	0.099	150	0.070	98	0.013	88
DCP 5	.074	2.853	1.795	68	0.675	354	0.229	313	0.338	264	0.204	208	0.097	160	0.129	132	0.097	91	0.031	67
DCP 6	.099	2.641	1.597	60	0.632	343	0.205	297	0.307	254	0.182	196	0.099	161	0.127	109	0.095	70	0.036	28
DCP 7	.149	2.167	1.402	48	0.630	330	0.206	260	0.251	235	0.170	157	0.073	132	0.088	63	0.050	29	0.042	6
DCP 8	.200	2.034	1.385	44	0.716	326	0.295	255	0.259	229	0.202	149	0.109	104	0.100	72	0.070	9	0.087	348
DCP 9	.250	1.852	1.283	34	0.709	303	0.340	216	0.304	178	0.239	96	0.153	37	0.147	356	0.099	304	0.070	278
DCP10	.300	1.729	1.134	27	0.634	288	0.346	191	0.250	145	0.191	58	0.101	344	0.075	286	0.049	240	0.049	226
DCP11	.399	1.598	1.064	19	0.621	273	0.406	173	0.228	101	0.185	13	0.121	303	0.082	235	0.051	226	0.054	149
DCP12	.501	1.280	0.936	4	0.548	242	0.392	139	0.209	40	0.166	328	0.096	247	0.067	179	0.042	168	0.033	41
DCP13	.600	1.052	0.782	348	0.456	210	0.333	100	0.203	346	0.158	265	0.078	192	0.041	94	0.021	282	0.025	284
DCP14	.701	0.875	0.587	337	0.394	181	0.257	63	0.219	303	0.117	205	0.053	117	0.008	331	0.017	274	0.013	230
DCP15	.800	0.624	0.385	332	0.263	161	0.182	40	0.187	276	0.068	165	0.043	70	0.024	273	0.029	117	0.009	109
DCP16	.900	0.371	0.302	312	0.262	130	0.181	322	0.104	171	0.075	299	0.081	137	0.092	335	0.086	172	0.069	13
DCP17	.969	0.238	0.280	301	0.277	121	0.233	320	0.164	168	0.132	344	0.110	177	0.092	7	0.077	226	0.037	19

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.67	0.483	0.212	5.91	0.0	0.02	12007.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
72.4 (237.4)	13406. (280.0)	0.34E 07	-0.006	0.552	4.12	-0.00119	0.758	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.015	5.906	0	0.507	344	0.136	196	0.066	132	0.026	123	0.016	109	0.023	251	0.016	72	0.017	68
CN		0.491	0.357	34	0.036	54	0.022	296	0.001	176	0.015	262	0.000	146	0.003	184	0.006	155	0.001	295
CM		-0.023	0.058	295	0.006	310	0.006	134	0.002	182	0.005	85	0.001	117	0.002	350	0.002	327	0.000	93
DCP 1	.010	-0.534	2.494	348	0.248	1	0.049	131	0.007	165	0.025	155	0.014	92	0.011	304	0.001	182	0.011	251
DCP 2	.020	-0.337	1.791	358	0.168	356	0.011	217	0.026	229	0.019	221	0.009	143	0.016	316	0.014	123	0.010	251
DCP 3	.030	0.049	1.492	358	0.124	349	0.025	231	0.006	163	0.020	193	0.009	231	0.013	76	0.014	141	0.006	203
DCP 4	.049	-0.023	1.218	1	0.094	2	0.010	228	0.003	241	0.016	179	0.003	139	0.001	53	0.009	222	0.004	124
DCP 5	.074	0.160	0.987	3	0.085	5	0.020	249	0.019	159	0.006	231	0.004	167	0.008	295	0.003	156	0.009	172
DCP 6	.099	0.370	0.850	8	0.079	15	0.030	280	0.025	154	0.008	265	0.010	208	0.007	327	0.007	131	0.010	253
DCP 7	.149	0.236	0.655	15	0.073	32	0.022	272	0.011	131	0.014	275	0.019	107	0.015	255	0.007	357	0.010	39
DCP 8	.200	0.252	0.562	27	0.077	42	0.026	291	0.018	272	0.011	272	0.006	1	0.012	121	0.008	245	0.022	190
DCP 9	.250	0.195	0.491	30	0.052	43	0.034	293	0.020	203	0.011	192	0.011	149	0.012	87	0.014	123	0.007	187
DCP10	.300	0.211	0.420	36	0.042	43	0.017	258	0.013	212	0.014	257	0.000	257	0.004	220	0.010	161	0.010	347
DCP11	.399	0.228	0.398	56	0.043	65	0.029	292	0.007	232	0.023	292	0.010	298	0.010	272	0.006	188	0.019	72
DCP12	.501	0.141	0.356	65	0.044	78	0.027	289	0.008	77	0.019	270	0.006	47	0.009	320	0.010	314	0.009	3
DCP13	.600	0.209	0.319	73	0.057	85	0.030	300	0.014	78	0.031	273	0.011	39	0.013	21	0.025	175	0.020	298
DCP14	.701	0.201	0.257	79	0.031	122	0.023	305	0.011	36	0.012	253	0.005	255	0.017	132	0.011	83	0.008	192
DCP15	.800	0.097	0.192	95	0.030	116	0.018	326	0.007	10	0.015	269	0.012	230	0.016	167	0.014	125	0.010	87
DCP16	.900	-0.073	0.103	108	0.029	127	0.030	294	0.025	319	0.016	238	0.015	206	0.010	215	0.010	245	0.015	295
DCP17	.969	0.010	0.061	153	0.035	241	0.032	3	0.018	177	0.021	255	0.027	28	0.016	160	0.024	121	0.024	164

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.58	0.499	0.205	5.95	0.0	2.52	12007.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
70.0 (229.4)	12654. (264.3)	0.33E 07	-0.088	0.759	6.64	-0.00123	0.757	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.520	5.946	0	0.511	345	0.150	189	0.072	136	0.006	129	0.019	14	0.016	227	0.025	123	0.002	123
CN		0.365	0.356	36	0.048	63	0.011	310	0.006	286	0.006	239	0.008	42	0.003	63	0.004	157	0.003	101
CM		-0.020	0.062	300	0.012	301	0.005	171	0.004	158	0.002	92	0.003	257	0.001	90	0.001	268	0.001	314
DCP 1	.010	0.957	2.371	349	0.238	356	0.064	180	0.019	134	0.028	185	0.008	0	0.018	324	0.012	330	0.021	60
DCP 2	.020	0.756	1.840	358	0.177	3	0.028	228	0.015	226	0.034	184	0.017	353	0.021	45	0.007	132	0.010	16
DCP 3	.030	0.974	1.535	358	0.152	359	0.025	265	0.009	257	0.014	167	0.008	247	0.007	181	0.018	96	0.311	4
DCP 4	.049	0.762	1.264	1	0.116	359	0.023	241	0.019	223	0.016	184	0.016	294	0.028	84	0.017	284	0.010	186
DCP 5	.074	0.812	1.018	4	0.103	8	0.032	222	0.320	176	0.016	248	0.017	313	0.011	58	0.015	193	0.002	284
DCP 6	.099	0.934	0.860	9	0.095	12	0.026	239	0.010	192	0.018	225	0.015	310	0.019	49	0.021	241	0.006	177
DCP 7	.149	0.645	0.656	16	0.083	32	0.027	201	0.012	233	0.010	241	0.014	344	0.019	97	0.008	161	0.015	201
DCP 8	.200	0.581	0.559	29	0.068	38	0.026	259	0.013	237	0.000	94	0.025	7	0.007	34	0.009	60	0.025	71
DCP 9	.250	0.473	0.508	28	0.064	45	0.005	9	0.012	223	0.013	213	0.009	339	0.012	188	0.021	177	0.011	333
DCP10	.300	0.471	0.459	33	0.063	53	0.018	280	0.013	213	0.00	9	0.002	49	0.015	149	0.005	217	0.012	100
DCP11	.399	0.425	0.399	54	0.064	75	0.011	355	0.016	268	0.006	176	0.006	312	0.010	16	0.009	157	0.007	96
DCP12	.501	0.277	0.359	67	0.069	87	0.015	345	0.008	241	0.008	55	0.012	96	0.001	35	0.006	350	0.010	155
DCP13	.600	0.322	0.311	77	0.061	108	0.013	352	0.005	357	0.004	175	0.021	84	0.011	1	0.016	219	0.006	117
DCP14	.701	0.277	0.271	88	0.062	92	0.025	339	0.015	27	0.026	276	0.021	77	0.002	342	0.009	118	0.003	343
DCP15	.800	0.147	0.220	102	0.043	127	0.025	336	0.012	352	0.039	249	0.016	45	0.306	76	0.013	56	0.008	327
DCP16	.900	-0.051	0.129	127	0.034	102	0.015	356	0.029	341	0.006	188	0.013	70	0.007	328	0.012	169	0.026	176
DCP17	.969	0.007	0.051	169	0.025	202	0.010	344	0.022	286	0.010	291	0.012	248	0.032	222	0.022	28	0.025	18

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.49	0.511	0.201	5.93	0.0	5.05	12007.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
68.3 (224.0)	12099. (252.7)	0.32E 07	-0.082	1.019	8.71	-0.00128	0.772	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.053	5.929	0	0.519	345	0.149	185	0.065	136	0.021	349	0.024	28	0.017	188	0.023	129	0.011	112
CN		0.593	0.372	36	0.050	61	0.021	347	0.011	257	0.003	312	0.004	359	0.005	263	0.004	195	0.002	43
CM		-0.015	0.063	299	0.013	288	0.008	193	0.004	116	0.001	253	0.001	197	0.001	82	0.001	14	0.001	252
DCP 1	.010	2.538	2.478	349	0.218	327	0.092	179	0.037	86	0.032	226	0 014	73	0.021	333	0.011	172	0.012	325
DCP 2	.020	1.940	1.893	358	0.168	4	0.031	226	0.012	105	0.010	231	0.002	176	0.009	314	0.012	27	0.019	10
DCP 3	.030	1.977	1.608	358	0.137	3	0.023	222	0.018	113	0.023	235	0 008	92	0.012	333	0.006	26	0.006	349
DCP 4	.049	1.606	1.321	1	0.112	359	0.024	235	0.022	175	0.017	274	0.004	299	0.009	102	0.006	344	0.012	241
DCP 5	.074	1.483	1.044	4	0.101	4	0.024	237	0.021	187	0.018	265	0.009	93	0.011	26	0.007	184	0.003	160
DCP 6	.099	1.481	0.885	10	0.088	14	0.028	288	0.019	182	0.009	291	0.006	282	0.005	21	0.005	322	0.004	281
DCP 7	.149	1.071	0.697	17	0.082	32	0.014	292	0.013	229	0.010	242	0.015	292	0.017	231	0.001	148	0.005	134
DCP 8	.200	0.916	0.593	29	0.067	44	0.039	293	0.019	236	0.017	313	0.009	297	0.013	163	0.007	264	0.011	57
DCP 9	.250	0.753	0.512	32	0.077	51	0.021	313	0.017	156	0.018	312	0.009	101	0.015	224	0.009	179	0.011	195
DCP10	.300	0.718	0.463	37	0.062	42	0.020	321	0.013	247	0.002	201	0.012	69	0.009	341	0.025	162	0.015	290
DCP11	.399	0.635	0.426	56	0.063	74	0.028	348	0.024	284	0.011	16	0.002	2°	0.004	129	0.012	219	0.009	49
DCP12	.501	0.431	0.369	67	0.069	89	0.044	359	0.020	259	0.006	251	0.011	324	0.007	334	0.006	284	0.003	222
DCP13	.600	0.417	0.326	78	0.074	87	0.040	4	0.026	240	0.005	155	0.010	295	0.017	254	0.007	349	0.015	317
DCP14	.701	0.362	0.270	86	0.062	89	0.021	11	0.021	282	0.010	39	0.001	4	0.011	297	0.003	209	0.021	77
DCP15	.800	0.182	0.216	101	0.044	98	0.026	7	0.010	254	0.011	39	0.005	108	0.013	257	0.011	62	0.003	251
DCP16	.900	-0.031	0.130	121	0.024	121	0.032	352	0.015	5	0.012	8	0.028	58	0.011	127	0.014	232	0.030	151
DCP17	.969	-0.006	0.036	159	0.028	127	0.039	62	0.022	352	0.031	179	0.021	291	0.008	304	0.023	169	0.037	4

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.50	0.511	0.201	5.93	0.0	7.54	12007.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.3 (224.1)	12104. (252.8)	0.32E 07	-0.094	1.241	11.64	-0.00143	0.868	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.542	5.930	0	0.509	344	0.159	186	0.062	129	0.026	353	0.020	12	0.022	192	0.024	114	0.005	198
CN		0.806	0.385	38	0.057	67	0.016	288	0.012	246	0.007	288	0.005	299	0.006	325	0.003	97	0.002	95
CM		-0.010	0.068	294	0.014	296	0.003	118	0.003	58	0.000	349	0.002	136	0.001	115	0.001	225	0.000	222
DCP 1	.010	3.849	2.174	348	0.300	35	0.157	333	0.082	230	0.051	240	0.055	207	0.021	144	0.020	120	0.015	69
DCP 2	.020	3.092	1.903	358	0.173	3	0.012	210	0.021	170	0.030	288	0.022	116	0.019	11	0.010	292	0.012	294
DCP 3	.030	2.932	1.611	358	0.144	2	0.009	187	0.012	163	0.018	282	0.003	46	0.004	105	0.015	192	0.002	222
DCP 4	.049	2.418	1.32.	0	0.132	7	0.005	35	0.003	2	0.026	282	0.005	133	0.006	359	0.011	206	0.017	44
DCP 5	.074	2.140	1.062	4	0.107	14	0.006	211	0.004	353	0.021	286	0.004	192	0.010	289	0.018	146	0.012	54
DCP 6	.099	2.012	0.905	9	0.092	22	0.019	293	0.003	354	0.018	271	0.009	108	0.009	352	0.025	159	0.013	77
DCP 7	.149	1.474	0.647	16	0.093	40	0.021	292	0.021	273	0.010	343	0.010	352	0.010	53	0.006	112	0.007	144
DCP 8	.200	1.236	0.596	30	0.076	54	0.008	17	0.001	161	0.018	308	0.012	355	0.016	343	0.005	233	0.011	151
DCP 9	.250	1.029	0.533	33	0.077	48	0.031	245	0.009	270	0.011	300	0.015	297	0.002	359	0.011	32	0.004	84
DCP10	.300	0.946	0.455	39	0.058	50	0.029	238	0.014	255	0.012	259	0.015	249	0.002	78	0.015	28	0.010	130
DCP11	.399	0.815	0.441	59	0.073	76	0.027	286	0.013	275	0.010	37	0.013	256	0.005	350	0.010	75	0.006	211
DCP12	.501	0.574	0.406	66	0.072	93	0.020	291	0.025	258	0.012	247	0.004	145	0.012	282	0.008	216	0.006	234
DCP13	.600	0.507	0.362	76	0.069	98	0.022	285	0.015	231	0.005	252	0.013	70	0.005	276	0.011	168	0.003	289
DCP14	.701	0.422	0.297	86	0.051	87	0.013	298	0.023	232	0.006	261	0.018	280	0.003	159	0.007	29.	0.006	20
DCP15	.800	0.225	0.220	97	0.059	107	0.021	303	0.012	219	0.001	38	0.004	293	0.002	67	0.009	64	0.011	6
DCP16	.900	-0.018	0.150	110	0.044	121	0.006	255	0.007	153	0.010	105	0.021	328	0.027	331	0.017	67	0.014	158
DCP17	.969	-0.012	0..	132	0.025	122	0.018	36	0.014	309	0.010	268	0.011	351	0.018	194	0.009	335	0.011	40

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.15	0.513	0.199	5.93	0.0	10.04	12007.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.7 (222.1)	11917. (248.9)	0.32E 07	-0.077	1.482	13.68	-0.00148	0.890	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.036	5.927	0	0.500	344	0.156	183	0.067	117	0.046	346	0.018	12	0.030	185	0.020	136	0.005	185
CN		1.016	0.386	39	0.063	57	0.021	309	0.009	295	0.010	349	0.008	271	0.006	151	0.002	201	0.006	126
CM		-0.005	0.069	293	0.013	275	0.006	157	0.004	96	0.003	195	0.004	87	0.003	334	0.001	45	0.002	318
DCP 1	.010	5.097	1.942	348	0.287	18	0.143	160	0.166	43	0.029	135	0.080	16	0.031	357	0.032	3	0.015	330
DCP 2	.020	4.206	1.874	358	0.177	8	0.040	262	0.022	60	0.023	276	0.024	7	0.008	111	0.012	161	0.009	142
DCP 3	.030	3.881	1.610	358	0.148	3	0.042	275	0.012	72	0.023	271	0.006	356	0.004	149	0.008	127	0.003	318
DCP 4	.049	3.236	1.323	1	0.128	12	0.015	295	0.015	203	0.014	315	0.019	156	0.010	349	0.012	180	0.002	75
DCP 5	.074	2.789	1.047	4	0.099	21	0.024	243	0.007	230	0.016	236	0.014	148	0.011	45	0.006	175	0.017	120
DCP 6	.099	2.541	0.885	9	0.092	27	0.023	258	0.015	198	0.011	309	0.001	97	0.003	20	0.014	191	0.015	119
DCP 7	.149	1.814	0.697	16	0.088	41	0.018	313	0.017	176	0.013	297	0.004	339	0.005	333	0.002	17	0.013	319
DCP 8	.200	1.562	0.583	28	0.082	51	0.027	283	0.004	196	0.015	331	0.008	195	0.007	269	0.015	168	0.006	327
DCP 9	.250	1.309	0.552	31	0.073	40	0.020	250	0.010	96	0.024	333	0.005	134	0.001	7	0.021	268	0.017	48
DCP10	.300	1.170	0.472	37	0.065	53	0.022	273	0.005	320	0.010	306	0.003	207	0.007	106	0.011	61	0.008	43
DCP11	.399	0.984	0.449	59	0.075	73	0.039	312	0.026	342	0.011	17	0.013	266	0.005	126	0.003	324	0.012	127
DCP12	.501	0.701	0.400	68	0.062	67	0.028	322	0.022	325	0.013	49	0.013	309	0.015	206	0.005	47	0.018	177
DCP13	.600	0.591	0.344	79	0.070	69	0.037	313	0.018	298	0.018	332	0.016	266	0.017	182	0.007	59	0.018	186
DCP14	.701	0.466	0.312	86	0.068	90	0.019	..	0.025	261	0.017	19	0.020	267	0.011	89	0.004	190	0.008	75
DCP15	.800	0.256	0.244	97	0.056	92	0.029	328	0.008	286	0.013	291	0.017	278	0.019	140	0.008	211	0.009	46
DCP16	.900	0.005	0.152	103	0.039	85	0.022	346	0.040	244	0.016	61	0.009	277	0.010	132	0.013	255	0.009	173
DCP17	.969	-0.003	0.060	112	0.016	55	0.011	32	0.020	53	0.029	14	0.010	193	0.010	207	0.006	147	0.017	118

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	67.57	0.508	0.199	3.90	0.0	12.52	12007.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.7 (222.2)	11937. (249.3)	0.32E 07	-0.070	1.597	16.59	-0.00130	0.782	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.520	5.902	0	0.496	343	0.151	184	0.057	120	0.043	339	0.019	60	0.024	181	0.011	103	0.005	261
CN		1.155	0.380	35	0.056	64	0.013	297	0.010	307	0.006	9	0.001	110	0.012	142	0.001	59	0.002	136
CM		-0.002	0.060	294	0.016	279	0.004	129	0.005	129	0.003	266	0.001	215	0.003	325	0.001	183	0.000	42
DCP 1	.010	5.831	1.597	359	0.485	340	0.213	174	0.145	170	0.033	170	0.070	170	0.026	172	0.015	72	0.006	208
DCP 2	.020	4.974	1.737	1	0.291	2	0.049	222	0.035	81	0.038	290	0.004	267	0.016	43	0.010	40	0.008	195
DCP 3	.030	4.614	1.590	358	0.159	2	0.008	254	0.004	304	0.032	262	0.005	58	0.016	1	0.007	143	0.014	337
DCP 4	.049	3.688	1.329	8	0.188	330	0.057	160	0.033	36	0.050	290	0.020	203	0.004	97	0.009	91	0.006	77
DCP 5	.074	3.142	1.089	10	0.119	332	0.036	139	0.016	343	0.022	274	0.019	99	0.007	105	0.010	189	0.013	154
DCP 6	.099	2.842	0.925	12	0.065	336	0.024	59	0.025	257	0.002	321	0.003	277	0.009	45	0.006	169	0.010	109
DCP 7	.149	2.148	0.733	14	0.025	12	0.021	13	0.013	234	0.017	281	0.005	105	0.007	59	0.012	85	0.005	64
DCP 8	.200	1.852	0.656	15	0.085	123	0.059	8	0.015	248	0.037	356	0.018	185	0.015	146	0.018	169	0.017	37
DCP 9	.250	1.515	0.511	25	0.114	73	0.054	298	0.012	131	0.035	333	0.023	180	0.017	124	0.003	234	0.009	29
DCP10	.300	1.350	0.421	31	0.105	73	0.067	279	0.019	87	0.018	352	0.007	324	0.015	95	0.008	107	0.008	123
DCP11	.399	1.117	0.309	53	0.096	84	0.027	276	0.011	9	0.013	77	0.029	327	0.043	152	0.011	318	0.014	181
DCP12	.501	0.803	0.357	64	0.080	84	0.020	282	0.022	317	0.010	98	0.036	204	0.018	174	0.014	291	0.013	144
DCP13	.600	0.638	0.337	76	0.055	83	0.017	289	0.034	311	0.006	101	0.017	42	0.015	208	0.006	12	0.009	355
DCP14	.701	0.507	0.288	85	0.065	79	0.006	330	0.034	297	0.003	226	0.006	90	0.008	161	0.007	84	0.011	282
DCP15	.800	0.262	0.221	97	0.052	98	0.020	358	0.015	318	0.007	359	0.006	73	0.009	143	0.010	19	0.008	306
DCP16	.900	0.036	0.118	112	0.049	95	0.028	261	0.017	261	0.022	111	0.017	202	0.026	114	0.003	346	0.008	175
DCP17	.969	0.000	0.064	91	0.020	34	0.017	105	0.011	60	0.021	57	0.015	31	0.018	348	0.007	176	0.016	110

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	67.31	0.504	0.200	3.90	0.0	15.07	12007.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.9 (222.9)	12018. (251.0)	0.32E 07	-0.085	1.581	19.50	-0.00063	0.137	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.072	5.897	0	0.397	337	0.116	194	0.065	148	0.063	359	0.021	116	0.007	152	0.020	188	0.012	15
CN		1.219	0.397	11	0.112	86	0.006	273	0.018	326	0.012	237	0.012	73	0.008	176	0.006	333	0.005	156
CM		-0.017	0.035	353	0.041	252	0.013	39	0.003	195	0.000	31	0.003	205	0.004	348	0.002	156	0.001	102
DCP 1	.010	4.957	1.902	52	0.739	343	0.443	283	0.321	193	0.067	135	0.099	305	0.042	252	0.032	207	0.020	350
DCP 2	.020	4.440	1.888	38	0.492	352	0.249	296	0.199	171	0.062	43	0.031	30	0.012	299	0.051	135	0.033	39
DCP 3	.030	4.241	1.880	26	0.255	301	0.117	331	0.093	152	0.019	211	0.073	2	0.061	191	0.028	55	0.045	347
DCP 4	.049	3.719	1.552	22	0.424	308	0.242	157	0.150	43	0.073	295	0.061	213	0.060	107	0.037	57	0.013	353
DCP 5	.074	3.165	1.402	19	0.348	274	0.249	118	0.143	357	0.086	258	0.049	158	0.041	44	0.024	327	0.023	187
DCP 6	.099	2.916	1.298	13	0.274	238	0.218	84	0.115	323	0.063	228	0.033	122	0.035	34	0.032	283	0.043	125
DCP 7	.149	2.335	1.146	1	0.258	181	0.155	68	0.133	328	0.100	219	0.062	110	0.037	26	0.021	296	0.028	144
DCP 8	.200	2.043	0.977	356	0.237	160	0.136	80	0.103	339	0.071	241	0.079	121	0.045	11	0.020	225	0.053	163
DCP 9	.250	1.763	0.779	342	0.320	123	0.135	22	0.114	271	0.049	152	0.054	32	0.037	268	0.029	168	0.033	111
DCP10	.300	1.536	0.577	339	0.296	103	0.109	342	0.074	233	0.054	110	0.037	336	0.047	218	0.022	51	0.007	176
DCP11	.399	1.246	0.367	347	0.337	97	0.137	316	0.053	159	0.050	38	0.011	239	0.037	186	0.022	350	0.016	10
DCP12	.501	0.871	0.164	6	0.234	77	0.111	269	0.035	134	0.064	343	0.027	134	0.012	134	0.012	255	0.013	208
DCP13	.600	0.653	0.096	45	0.198	66	0.086	241	0.044	53	0.065	269	0.023	45	0.008	231	0.017	114	0.017	297
DCP14	.701	0.471	0.097	96	0.167	58	0.085	206	0.046	23	0.037	245	0.023	72	0.019	222	0.032	354	0.019	239
DCP15	.800	0.295	0.152	124	0.120	54	0.078	170	0.040	333	0.023	142	0.021	355	0.023	158	0.025	306	0.007	141
DCP16	.900	0.145	0.122	117	0.070	16	0.047	157	0.027	291	0.026	177	0.001	43	0.036	126	0.022	259	0.009	5
DCP17	.969	0.046	0.051	125	0.033	61	0.024	140	0.002	308	0.023	76	0.017	342	0.011	243	0.032	83	0.013	74

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.74	0.516	0.200	5.96	0.0	17.56	12007.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.8 (222.6)	12023. (251.1)	0.32E 07	-0.260	1.795	23.99	0.00106	-0.637	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.561	5.962 0	0.486 331	0.130 203	0.053 115	0.051 1	0.024 58	0.025 176	0.016 125	0.005 311
CN		1.325	0.562 359	0.133 102	0.036 266	0.034 55	0.016 253	0.017 25	0.011 188	0.009 161	0.007 324
CM		-0.077	0.079 49	0.075 243	0.022 83	0.006 278	0.007 27	0.008 223	0.002 314	0.003 73	0.003 88
DCP 1	.010	4.289	2.481 55	0.357 359	0.285 331	0.286 317	0.231 257	0.147 211	0.100 116	0.118 47	0.106 345
DCP 2	.020	3.984	2.633 45	0.505 332	0.218 237	0.126 86	0.106 6	0.118 274	0.106 188	0.130 108	0.092 37
DCP 3	.030	3.817	2.447 39	0.571 335	0.423 254	0.215 154	0.185 104	0.184 10	0.118 317	0.121 243	0.094 182
DCP 4	.049	3.480	2.173 33	0.586 295	0.215 210	0.191 132	0.125 38	0.079 340	0.080 274	0.053 174	0.043 172
DCP 5	.074	3.045	1.912 25	0.410 277	0.232 198	0.204 102	0.119 24	0.091 324	0.092 254	0.088 145	0.064 86
DCP 6	.099	2.798	1.775 20	0.358 259	0.249 173	0.187 79	0.142 359	0.074 283	0.094 219	0.072 121	0.053 47
DCP 7	.149	2.311	1.621 5	0.384 231	0.241 143	0.179 67	0.145 330	0.085 249	0.093 168	0.075 64	0.081 348
DCP 8	.200	2.035	1.447 3	0.396 220	0.210 132	0.197 49	0.143 312	0.099 213	0.081 116	0.044 53	0.041 325
DCP 9	.250	1.789	1.236 347	0.443 177	0.265 80	0.283 347	0.206 229	0.119 139	0.106 55	0.073 312	0.061 199
DCP10	.300	1.601	1.043 341	0.437 156	0.258 42	0.226 296	0.160 185	0.113 76	0.064 318	0.036 238	0.019 100
DCP11	.399	1.393	0.760 336	0.537 140	0.295 11	0.188 252	0.112 146	0.101 36	0.050 279	0.078 175	0.025 15
DCP12	.501	1.109	0.543 316	0.585 108	0.299 312	0.139 166	0.068 56	0.063 321	0.062 154	0.017 70	0.032 254
DCP13	.600	0.902	0.305 283	0.529 81	0.281 270	0.160 113	0.078 324	0.035 199	0.021 87	0.006 57	0.018 227
DCP14	.701	0.752	0.218 232	0.444 48	0.209 231	0.135 75	0.088 260	0.053 80	0.030 264	0.009 234	0.008 358
DCP15	.800	0.595	0.207 186	0.316 22	0.132 206	0.087 14	0.047 189	0.035 359	0.029 164	0.014 209	0.014 260
DCP16	.900	0.248	0.107 157	0.180 357	0.078 198	0.082 12	0.061 154	0.039 354	0.042 50	0.015 261	0.024 325
DCP17	.969	0.163	0.126 187	0.161 344	0.076 109	0.049 228	0.055 335	0.049 70	0.042 211	0.031 295	0.017 142

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.82	0.520	0.198	5.93	0.0	19.97	12007.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.3 (220.9)	11846. (247.4)	0.32E 07	-0.314	2.081	25.94	0.00215	-1.284	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		19.973	5.931 0	0.532 332	0.100 210	0.060 138	0.045 19	0.015 46	0.018 193	0.019 132	0.003 41
CN		1.442	0.654 7	0.058 157	0.031 331	0.034 176	0.008 16	0.019 86	0.004 107	0.013 339	0.011 265
CM		-0.136	0.113 70	0.058 267	0.019 176	0.013 30	0.009 164	0.007 318	0.004 43	0.004 241	0.003 49
DCP 1	.010	3.621	2.723 67	0.629 52	0.237 319	0.138 358	0.237 28	0.170 356	0.137 283	0.154 247	0.125 178
DCP 2	.020	3.413	2.636 62	0.643 44	0.310 315	0.242 258	0.148 161	0.128 89	0.068 42	0.059 331	0.057 305
DCP 3	.030	3.346	2.527 57	0.634 26	0.423 304	0.213 262	0.266 199	0.183 147	0.167 94	0.127 67	0.136 3
DCP 4	.049	3.264	2.292 49	0.581 347	0.378 278	0.247 210	0.126 171	0.170 114	0.121 75	0.118 17	0.118 335
DCP 5	.074	2.902	2.029 39	0.510 326	0.413 253	0.279 175	0.133 125	0.160 69	0.080 17	0.108 327	0.088 274
DCP 6	.099	2.724	1.852 32	0.457 308	0.367 235	0.270 157	0.152 99	0.138 42	0.064 332	0.089 293	0.068 226
DCP 7	.149	2.307	1.759 20	0.517 286	0.321 214	0.291 136	0.120 62	0.147 4	0.091 297	0.102 219	0.089 147
DCP 8	.200	2.063	1.694 19	0.600 271	0.355 199	0.303 109	0.173 38	0.146 333	0.067 260	0.055 208	0.043 147
DCP 9	.250	1.900	1.552 7	0.651 234	0.405 144	0.354 51	0.210 316	0.146 247	0.089 166	0.067 74	0.077 20
DCP10	.300	1.767	1.363 359	0.594 213	0.385 104	0.299 3	0.188 263	0.114 185	0.077 118	0.067 4	0.075 302
DCP11	.399	1.596	1.052 350	0.610 186	0.422 64	0.261 316	0.126 207	0.079 127	0.047 103	0.055 312	0.038 233
DCP12	.501	1.313	0.766 329	0.587 144	0.415 13	0.252 243	0.107 124	0.050 26	0.028 17	0.020 175	0.021 122
DCP13	.600	1.143	0.529 301	0.522 109	0.371 334	0.225 194	0.065 68	0.028 341	0.021 19	0.015 25	0.031 3
DCP14	.701	0.967	0.353 259	0.428 74	0.273 290	0.131 126	0.043 327	0.018 184	0.010 139	0.006 263	0.033 270
DCP15	.800	0.745	0.268 216	0.302 47	0.196 253	0.093 80	0.035 232	0.002 351	0.034 129	0.016 225	0.017 286
DCP16	.900	0.417	0.254 199	0.255 4	0.077 160	0.081 170	0.094 332	0.080 91	0.054 231	0.043 28	0.036 172
DCP17	.969	0.336	0.393 211	0.344 351	0.229 122	0.188 248	0.144 24	0.112 159	0.089 286	0.072 82	0.018 208

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.113	0.308	5.14	0.0	0.03	12009.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
104.4 (342.5)	28259. (590.2)	0.49E 07	-0.039	0.567	5.24	-0.00083	0.702	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.028	5.136 0	0.238 5	0.050 258	0.004 125	0.007 53	0.029 76	0.034 187	0.041 179	0.004 308
CN		0.126	0.430 355	0.016 0	0.001 178	0.001 85	0.003 274	0.001 76	0.005 208	0.018 205	0.002 42
CM		-0.018	0.013 303	0.001 352	0.001 19	0.000 273	0.001 98	0.001 178	0.002 29	0.007 15	0.001 201
DCP 1	.010	-0.632	3.105 347	0.226 31	0.049 116	0.014 188	0.003 207	0.012 121	0.002 300	0.022 312	0.012 167
DCP 2	.020	-0.331	2.245 350	0.089 349	0.008 358	0.003 259	0.002 253	0.012 164	0.007 347	0.018 324	0.011 187
DCP 3	.030	-0.015	1.868 350	0.072 333	0.008 331	0.004 268	0.003 262	0.006 132	0.002 244	0.013 328	0.006 191
DCP 4	.049	0.106	1.519 350	0.058 332	0.008 333	0.004 252	0.003 225	0.007 129	0.001 56	0.017 327	0.004 212
DCP 5	.074	0.276	1.217 350	0.047 344	0.002 302	0.002 242	0.004 174	0.007 136	0.002 36	0.015 324	0.004 173
DCP 6	.099	0.365	1.053 351	0.040 351	0.010 322	0.001 154	0.005 167	0.003 86	0.001 316	0.015 309	0.006 190
DCP 7	.149	0.231	0.786 352	0.033 4	0.003 3	0.005 31	0.004 305	0.005 164	0.006 301	0.010 300	0.007 153
DCP 8	.200	0.205	0.642 355	0.027 355	0.004 34	0.003 174	0.002 199	0.005 146	0.003 334	0.009 329	0.003 191
DCP 9	.250	0.175	0.559 354	0.027 3	0.001 230	0.003 127	0.004 268	0.001 83	0.008 179	0.027 192	0.004 338
DCP10	.300	0.190	0.466 355	0.019 359	0.002 205	0.005 38	0.006 256	0.003 38	0.006 179	0.019 188	0.002 202
DCP11	.399	0.183	0.374 0	0.012 14	0.004 158	0.004 36	0.009 295	0.003 63	0.009 203	0.030 200	0.004 81
DCP12	.501	0.120	0.283 4	0.009 11	0.006 149	0.001 309	0.003 311	0.001 249	0.006 222	0.024 201	0.003 104
DCP13	.600	0.151	0.219 6	0.008 34	0.003 170	0.004 223	0.004 284	0.003 306	0.008 197	0.027 203	0.005 26
DCP14	.701	0.195	0.155 6	0.004 6	0.003 235	0.002 172	0.002 350	0.003 280	0.007 200	0.028 194	0.006 60
DCP15	.800	0.096	0.093 14	0.001 61	0.000 292	0.003 110	0.004 353	0.003 9	0.009 215	0.027 201	0.005 23
DCP16	.900	-0.061	0.029 23	0.004 220	0.001 297	0.008 51	0.008 229	0.002 359	0.005 222	0.023 186	0.006 12
DCP17	.969	-0.028	0.019 195	0.004 200	0.006 206	0.008 228	0.004 141	0.008 67	0.012 196	0.028 205	0.003 351

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.15	0.115	0.304	5.15	0.0	2.55	12009.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
102.9 (337.7)	27617. (576.8)	0.49E 07	-0.030	0.790	7.62	-0.00091	0.756	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.455	5.155 0	0.233 6	0.049 261	0.005 203	0.015 24	0.011 89	0.023 186	0.006 142	0.006 21
CN		0.358	0.434 355	0.019 14	0.002 62	0.002 353	0.001 276	0.001 265	0.001 134	0.004 161	0.003 14
CM		-0.014	0.014 300	0.002 253	0.001 275	0.001 173	0.000 340	0.001 152	0.000 354	0.001 306	0.001 189
DCP 1	.010	1.005	2.898 347	0.118 8	0.007 29	0.003 163	0.011 291	0.010 181	0.004 25	0.007 217	0.015 302
DCP 2	.020	0.850	2.248 350	0.080 356	0.032 323	0.007 28	0.013 302	0.015 197	0.007 122	0.013 227	0.013 309
DCP 3	.030	0.969	1.905 350	0.068 354	0.027 331	0.002 118	0.013 317	0.012 183	0.008 86	0.006 204	0.013 341
DCP 4	.049	0.929	1.571 350	0.055 342	0.015 337	0.002 117	0.007 299	0.004 189	0.002 27	0.008 231	0.005 13
DCP 5	.074	0.942	1.243 350	0.042 346	0.011 324	0.003 206	0.005 299	0.001 172	0.003 251	0.004 212	0.004 284
DCP 6	.099	0.924	1.064 351	0.039 358	0.007 314	0.001 107	0.002 311	0.001 284	0.002 253	0.004 203	0.003 302
DCP 7	.149	0.660	0.802 352	0.033 0	0.003 345	0.003 257	0.004 98	0.003 191	0.003 307	0.006 197	0.004 346
DCP 8	.200	0.553	0.654 355	0.025 1	0.008 1	0.003 1	0.004 337	0.001 277	0.002 65	0.009 221	0.006 69
DCP 9	.250	0.470	0.567 355	0.027 10	0.006 231	0.003 39	0.002 281	0.001 241	0.002 287	0.005 107	0.006 70
DCP10	.300	0.447	0.475 355	0.024 20	0.002 297	0.005 335	0.003 20	0.005 218	0.004 9	0.002 152	0.003 6
DCP11	.399	0.385	0.374 1	0.015 27	0.004 108	0.003 352	0.005 308	0.002 134	0.001 51	0.004 156	0.004 16
DCP12	.501	0.272	0.292 4	0.012 35	0.011 117	0.001 89	0.004 261	0.002 73	0.005 130	0.004 179	0.002 65
DCP13	.600	0.264	0.223 6	0.017 46	0.009 103	0.002 290	0.004 214	0.005 356	0.005 134	0.004 183	0.011 52
DCP14	.701	0.275	0.152 10	0.011 37	0.007 53	0.004 16	0.004 156	0.007 9	0.005 144	0.006 99	0.006 15
DCP15	.800	0.142	0.091 17	0.011 37	0.006 42	0.002 262	0.003 82	0.003 312	0.004 136	0.005 129	0.003 15
DCP16	.900	-0.048	0.029 26	0.005 63	0.008 328	0.007 10	0.003 160	0.005 230	0.007 283	0.005 121	0.007 261
DCP17	.969	-0.034	0.013 181	0.004 343	0.010 176	0.001 321	0.002 294	0.002 247	0.002 267	0.006 144	0.004 328

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.16	0.115	0.302	5.15	0.0	5.01	12009.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
102.1 (335.1)	27273. (569.6)	0.48E 07	-0.026	1.005	9.95	-0.00094	0.779	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.009	5.147	0	0.237	8	0.036	257	0.003	305	0.013	351	0.006	213	0.027	229	0.005	225	0.004	77
CN		0.594	0.426	356	0.022	17	0.005	40	0.003	249	0.002	338	0.001	207	0.005	348	0.006	317	0.003	224
CM		-0.009	0.015	305	0.002	263	0.001	262	0.000	114	0.000	210	0.000	13	0.001	183	0.001	119	0.001	90
DCP 1	.010	2.563	2.774	347	0.144	16	0.066	339	0.050	227	0.020	149	0.009	137	0.004	345	0.024	341	0.005	212
DCP 2	.020	2.096	2.263	350	0.101	356	0.018	355	0.008	236	0.003	147	0.003	120	0.009	337	0.022	342	0.010	187
DCP 3	.030	2.015	1.913	350	0.085	353	0.009	356	0.004	354	0.006	205	0.002	102	0.007	335	0.013	340	0.007	198
DCP 4	.049	1.797	1.589	350	0.067	346	0.011	337	0.001	233	0.005	282	0.007	237	0.010	329	0.012	344	0.012	159
DCP 5	.074	1.632	1.259	351	0.053	355	0.013	356	0.004	201	0.005	301	0.005	223	0.010	332	0.011	332	0.012	181
DCP 6	.099	1.510	1.062	351	0.045	357	0.010	356	0.001	221	0.003	316	0.005	230	0.007	348	0.011	329	0.009	170
DCP 7	.149	1.098	0.790	353	0.030	1	0.008	322	0.008	191	0.010	294	0.005	222	0.007	346	0.014	322	0.003	138
DCP 8	.200	0.905	0.646	356	0.030	6	0.011	24	0.006	216	0.003	79	0.002	59	0.005	358	0.010	313	0.007	192
DCP 9	.250	0.779	0.557	355	0.030	10	0.006	178	0.004	256	0.003	31	0.005	193	0.000	325	0.004	310	0.003	306
DCP10	.300	0.706	0.460	356	0.023	23	0.006	56	0.001	284	0.006	278	0.004	150	0.004	299	0.005	296	0.002	257
DCP11	.399	0.592	0.367	1	0.019	32	0.011	88	0.002	333	0.009	327	0.002	222	0.008	346	0.001	263	0.005	162
DCP12	.501	0.429	0.280	5	0.020	29	0.007	102	0.005	263	0.002	174	0.001	306	0.005	338	0.005	327	0.003	145
DCP13	.600	0.380	0.210	7	0.017	23	0.010	64	0.006	264	0.003	105	0.006	4	0.002	342	0.005	291	0.002	190
DCP14	.701	0.353	0.143	12	0.020	62	0.008	11	0.002	290	0.009	60	0.002	306	0.009	344	0.005	312	0.003	225
DCP15	.800	0.188	0.082	20	0.011	58	0.007	29	0.001	106	0.006	45	0.004	243	0.005	25	0.007	297	0.003	253
DCP16	.900	-0.044	0.031	35	0.004	93	0.004	72	0.005	296	0.009	269	0.008	161	0.007	356	0.004	357	0	4 239
DCP17	.969	-0.043	0.010	219	0.003	31	0.008	185	0.002	166	0.005	173	0.002	132	0.009	26	0.007	299	0.001	203

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.116	0.300	5.14	0.0	7.48	12009.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
101.6 (333.2)	27019. (564.3)	0.48E 07	-0.023	1.210	12.61	-0.00112	0.921	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.477	5.140	0	0.247	7	0.051	264	0.003	308	0.012	55	0.013	354	0.020	201	0.006	170	0.006	133
CN		0.816	0.403	358	0.029	21	0.002	336	0.004	101	0.002	22	0.001	51	0.001	335	0.006	325	0.003	200
CM		-0.003	0.018	307	0.002	253	0.001	246	0.001	288	0.001	287	0.001	224	0.000	70	0.001	109	0.000	122
DCP 1	.010	4.060	2.722	348	0.154	331	0.110	167	0.132	64	0.081	324	0.015	261	0.019	302	0.016	5	0.015	211
DCP 2	.020	3.261	2.136	351	0.125	22	0.054	342	0.018	231	0.007	284	0.012	205	0.007	329	0.017	22	0.008	231
DCP 3	.030	3.024	1.861	351	0.094	359	0.015	338	0.009	225	0.005	309	0.009	196	0.004	7	0.006	11	0.010	215
DCP 4	.049	2.634	1.531	351	0.090	11	0.024	329	0.007	232	0.003	41	0.002	306	0.006	37	0.012	18	0.008	186
DCP 5	.074	2.295	1.206	352	0.071	13	0.016	330	0.005	222	0.002	21	0.002	350	0.004	13	0.012	11	0.007	186
DCP 6	.099	2.062	1.016	353	0.060	16	0.014	332	0.006	226	0.004	277	0.004	281	0.005	346	0.014	19	0.004	187
DCP 7	.149	1.512	0.771	354	0.047	18	0.003	320	0.009	141	0.007	349	0.005	173	0.008	349	0.011	359	0.008	190
DCP 8	.200	1.243	0.625	357	0.042	14	0.011	319	0.005	151	0.006	83	0.005	217	0.005	62	0.010	13	0.006	195
DCP 9	.250	1.065	0.537	357	0.030	6	0.007	238	0.006	113	0.004	36	0.001	87	0.003	27	0.007	350	0.001	165
DCP10	.300	0.944	0.434	358	0.033	21	0.000	157	0.006	55	0.004	169	0.001	14	0.003	49	0.005	257	0.005	285
DCP11	.399	0.782	0.347	5	0.031	30	0.002	179	0.004	43	0.002	343	0.004	79	0.001	193	0.009	307	0.005	148
DCP12	.501	0.573	0.261	8	0.023	37	0.003	205	0.007	114	0.003	9	0.004	45	0.004	226	0.008	276	0.005	196
DCP13	.600	0.476	0.194	12	0.021	47	0.005	99	0.007	110	0.005	58	0.004	65	0.002	251	0.010	310	0.003	208
DCP14	.701	0.422	0.123	23	0.024	46	0.002	326	0.005	67	0.004	104	0.003	356	0.003	65	0.003	340	0.001	158
DCP15	.800	0.227	0.069	33	0.011	45	0.005	35	0.001	224	0.003	110	0.002	322	0.004	7	0.003	266	0.004	289
DCP16	.900	-0.026	0.029	42	0.002	0	0.007	10	0.002	287	0.003	173	0.001	32	0.008	217	0.006	264	0.004	127
DCP17	.969	-0.049	0.012	104	0.004	298	0.005	156	0.008	124	0.004	317	0.004	142	0.008	305	0.010	355	0.006	341

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.26	0.117	0.300	5.12	0.0	9.99	12009.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.2 (331.9)	26875. (561.3)	0.48E 07	-0.092	1.404	15.10	-0.00048	0.390	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.993	5.121 0	0.266 14	0.062 265	0.012 195	0.032 78	0.037 347	0.031 164	0.013 154	0.007 304
CN		0.943	0.351 22	0.100 339	0.037 174	0.022 34	0.013 310	0.013 230	0.016 138	0.011 72	0.015 313
CM		-0.011	0.019 207	0.026 52	0.021 292	0.013 174	0.005 66	0.004 11	0.003 295	0.002 235	0.004 117
DCP 1	.010	4.406	1.175 22	1.146 38	0.609 314	0.393 244	0.317 179	0.205 108	0.112 30	0.060 261	0.078 184
DCP 2	.020	3.521	0.903 29	1.017 45	0.602 320	0.364 237	0.243 166	0.167 101	0.126 49	0.062 349	0.069 302
DCP 3	.030	3.143	0.757 41	0.987 38	0.558 305	0.255 211	0.088 161	0.118 139	0.165 61	0.117 331	0.089 257
DCP 4	.049	3.074	1.078 12	0.380 16	0.135 279	0.073 172	0.048 76	0.033 352	0.017 264	0.015 186	0.006 116
DCP 5	.074	2.612	0.818 15	0.337 16	0.127 273	0.071 161	0.041 55	0.034 324	0.021 216	0.022 145	0.008 18
DCP 6	.099	2.296	0.680 20	0.316 15	0.125 267	0.077 152	0.045 47	0.033 315	0.023 206	0.015 133	0.006 337
DCP 7	.149	1.710	0.555 24	0.264 2	0.118 241	0.061 130	0.036 22	0.021 299	0.008 216	0.014 162	0.002 296
DCP 8	.200	1.450	0.562 23	0.224 338	0.140 210	0.091 95	0.053 0	0.032 285	0.026 193	0.025 134	0.011 351
DCP 9	.250	1.274	0.564 19	0.216 313	0.159 179	0.105 74	0.063 351	0.053 281	0.053 191	0.043 107	0.035 13
DCP10	.300	1.138	0.502 17	0.193 300	0.150 170	0.096 69	0.064 355	0.063 275	0.057 178	0.036 85	0.024 4
DCP11	.399	0.943	0.415 20	0.146 293	0.124 157	0.082 46	0.049 328	0.048 255	0.043 159	0.028 72	0.021 336
DCP12	.501	0.687	0.302 23	0.092 282	0.101 131	0.076 18	0.050 285	0.035 205	0.034 126	0.023 43	0.025 323
DCP13	.600	0.546	0.228 29	0.069 273	0.086 115	0.063 352	0.038 260	0.033 173	0.022 90	0.016 38	0.021 317
DCP14	.701	0.457	0.152 40	0.050 260	0.072 103	0.063 329	0.021 232	0.015 159	0.015 88	0.009 4	0.022 295
DCP15	.800	0.268	0.118 29	0.061 233	0.063 93	0.042 320	0.013 202	0.003 174	0.009 110	0.006 44	0.026 280
DCP16	.900	0.016	0.085 1	0.044 212	0.022 81	0.017 313	0.014 220	0.016 122	0.009 1	0.005 207	0.009 229
DCP17	.969	-0.032	0.035 350	0.024 222	0.018 62	0.012 297	0.007 164	0.004 133	0.007 29	0.004 155	0.005 230

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.22	0.117	0.299	5.08	0.0	12.48	12009.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.1 (330.8)	26732. (558.3)	0.48E 07	-0.183	1.691	16.86	-0.00108	0.882	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.478	5.084 0	0.239 14	0.016 315	0.052 351	0.039 291	0.071 165	0.025 230	0.016 35	0.013 306
CN		1.049	0.299 52	0.160 16	0.082 302	0.063 219	0.042 143	0.032 70	0.020 359	0.008 46	0.024 293
CM		-0.025	0.054 199	0.038 94	0.021 46	0.020 346	0.013 280	0.011 210	0.006 139	0.001 41	0.005 80
DCP 1	.010	4.584	0.774 143	1.352 81	0.726 40	0.427 357	0.235 333	0.156 341	0.197 307	0.107 253	0.060 216
DCP 2	.020	3.801	0.603 134	1.167 79	0.491 32	0.264 359	0.162 326	0.089 328	0.148 305	0.114 257	0.097 241
DCP 3	.030	3.302	0.745 135	1.062 69	0.246 25	0.236 39	0.205 340	0.092 319	0.136 308	0.120 254	0.075 233
DCP 4	.049	3.323	0.454 61	0.620 61	0.260 6	0.148 313	0.105 261	0.072 203	0.051 153	0.044 106	0.011 21
DCP 5	.074	2.792	0.414 75	0.595 54	0.226 347	0.116 281	0.066 222	0.048 166	0.029 112	0.031 70	0.014 324
DCP 6	.099	2.448	0.427 80	0.511 48	0.213 335	0.111 267	0.055 204	0.038 160	0.028 121	0.031 85	0.012 347
DCP 7	.149	1.880	0.440 64	0.381 29	0.153 313	0.089 247	0.056 186	0.027 122	0.008 64	0.019 89	0.007 335
DCP 8	.200	1.579	0.462 59	0.339 21	0.165 314	0.137 255	0.100 195	0.060 135	0.036 85	0.027 60	0.020 330
DCP 9	.250	1.385	0.488 53	0.305 7	0.175 305	0.159 240	0.127 169	0.072 111	0.044 71	0.044 49	0.032 317
DCP10	.300	1.229	0.457 50	0.277 1	0.174 300	0.162 234	0.116 166	0.079 115	0.052 61	0.047 42	0.046 336
DCP11	.399	1.041	0.424 48	0.223 351	0.152 294	0.144 229	0.102 162	0.081 107	0.044 57	0.042 58	0.062 344
DCP12	.501	0.797	0.365 41	0.159 331	0.109 273	0.118 202	0.090 129	0.073 73	0.043 17	0.032 18	0.061 305
DCP13	.600	0.637	0.303 40	0.126 310	0.081 242	0.094 179	0.076 105	0.057 42	0.042 349	0.016 351	0.052 277
DCP14	.701	0.542	0.244 38	0.118 288	0.069 222	0.085 155	0.062 81	0.053 16	0.043 316	0.021 241	0.031 243
DCP15	.800	0.345	0.205 21	0.104 270	0.065 219	0.075 142	0.039 66	0.047 9	0.044 294	0.025 219	0.025 199
DCP16	.900	0.071	0.148 6	0.064 265	0.047 216	0.041 133	0.028 66	0.040 354	0.026 265	0.020 191	0.018 207
DCP17	.969	-0.003	0.078 357	0.028 282	0.026 243	0.018 147	0.016 94	0.022 353	0.013 270	0.012 191	0.011 180

REPRODUCIBILITY OF THE ORIGINAL PAGE IS P

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.24	0.118	0.298	5.05	0.0	15.04	12000.7	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
100.6 (330.0)	26660 (556.8)	0.488 07	-0.219	1.028	17.82	-0.00164	1.398	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.036	5.048	0	0.224	16	0.022	192	0.027	96	0.082	60	0.100	328	0.040	184	0.009	198	0.004	149
CN		1.093	0.324	81	0.149	52	0.078	5	0.061	343	0.258	285	0.046	267	0.036	206	0.027	165	0.013	158
CM		-0.043	0.075	198	0.024	143	0.027	122	0.017	107	0.018	63	0.013	27	0.010	354	0.011	313	0.003	278
DCP 1	.010	4.240	1.989	159	0.989	110	0.543	127	0.403	128	0.213	114	0.172	154	0.166	134	0.078	128	0.040	110
DCP 2	.020	3.642	1.568	155	0.715	102	0.406	125	0.224	114	0.142	108	0.104	151	0.139	143	0.107	138	0.068	124
DCP 3	.030	3.187	1.483	149	0.416	98	0.479	138	0.145	113	0.213	132	0.092	116	0.130	133	0.067	109	0.004	134
DCP 4	.049	3.350	0.678	136	0.564	100	0.293	82	0.192	58	0.121	17	0.088	347	0.051	297	0.019	316	0.047	36
DCP 5	.074	2.808	0.685	128	0.451	84	0.203	66	0.331	33	0.085	347	0.056	327	0.045	278	0.020	289	0.016	333
DCP 6	.099	2.452	0.688	121	0.387	7	0.162	56	0.118	20	0.084	327	0.040	308	0.037	248	0.019	269	0.003	288
DCP 7	.149	1.939	0.587	96	0.263	5	0.177	42	0.103	3	0.095	331	0.063	288	0.039	243	0.020	300	0.016	227
DCP 8	.200	1.617	0.549	91	0.277	60	0.197	36	0.123	7	0.122	333	0.083	296	0.047	264	0.035	294	0.013	158
DCP 9	.250	1.448	0.530	82	0.291	49	0.201	14	0.133	357	0.143	316	0.095	284	0.061	248	0.037	242	0.032	226
DCP10	.300	1.287	0.476	76	0.263	46	0.181	6	0.140	353	0.126	308	0.089	279	0.049	251	0.042	239	0.033	230
DCP11	.399	1.103	0.429	68	0.210	40	0.144	354	0.116	348	0.106	300	0.090	279	0.050	241	0.055	222	0.035	226
DCP12	.501	0.871	0.373	57	0.145	24	0.123	330	0.082	327	0.088	276	0.072	247	0.058	217	0.061	193	0.036	181
DCP13	.600	0.715	0.344	49	0.106	4	0.119	318	0.078	300	0.100	260	0.081	225	0.066	201	0.080	167	0.040	144
DCP14	.701	0.608	0.301	40	0.070	329	0.105	300	0.070	283	0.094	239	0.074	200	0.061	171	0.060	132	0.030	104
DCP15	.800	0.417	0.266	23	0.060	318	0.085	293	0.064	281	0.074	225	0.060	187	0.054	154	0.050	106	0.024	75
DCP16	.900	0.136	0.191	11	0.051	333	0.046	265	0.043	264	0.035	198	0.038	168	0.027	130	0.040	100	0.021	16
DCP17	.969	0.023	0.087	12	0.032	349	0.030	288	0.017	260	0.021	215	0.017	164	0.023	139	0.024	121	0.016	45

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.27	0.118	0.299	5.04	0.0	17.91	12009.8	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
100.6 (330.1)	26703. (557.7)	0.48E 07	-0.214	1.845	17.99	-0.00265	2.154	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.912	5.041	0	0.190	4	0.067	238	0.030	189	0.031	142	0.069	112	0.019	234	0.020	35	0.009	34
CN		1.090	0.352	96	0.133	83	0.076	91	0.055	68	0.047	95	0.044	48	0.022	32	0.029	33	0.015	44
CM		-0.057	0.075	206	0.037	206	0.021	195	0.016	199	0.014	187	0.013	182	0.004	169	0.009	183	0.004	149
DCP 1	.010	3.647	2.455	164	0.685	178	0.684	200	0.276	235	0.252	252	0.136	318	0.143	295	0.008	313	0.119	328
DCP 2	.020	3.176	1.920	160	0.478	178	0.424	188	0.190	222	0.144	262	0.120	300	0.140	323	0.121	341	0.113	3
DCP 3	.030	2.788	1.665	153	0.564	206	0.295	180	0.295	220	0.144	268	0.092	260	0.122	302	0.077	334	0.055	344
DCP 4	.049	3.311	0.865	154	0.398	141	0.229	152	0.143	161	0.108	190	0.078	145	0.080	124	0.051	194	0.042	184
DCP 5	.074	2.756	0.826	141	0.286	121	0.162	138	0.099	144	0.085	115	0.084	119	0.029	87	0.030	165	0.029	134
DCP 6	.099	2.416	0.797	129	0.219	115	0.181	124	0.077	109	0.086	108	0.031	83	0.035	84	0.019	195	0.000	115
DCP 7	.149	1.922	0.613	105	0.198	117	0.143	105	0.091	112	0.076	98	0.057	91	0.035	62	0.022	128	0.012	116
DCP 8	.200	1.578	0.598	108	0.269	109	0.177	109	0.147	98	0.116	98	0.086	89	0.038	89	0.051	100	0.023	122
DCP 9	.250	1.435	0.571	99	0.266	97	0.181	100	0.157	80	0.110	93	0.088	75	0.054	87	0.050	71	0.035	108
DCP10	.300	1.291	0.518	91	0.245	88	0.177	97	0.146	80	0.117	85	0.087	77	0.054	77	0.051	62	0.032	101
DCP11	.399	1.119	0.458	82	0.201	76	0.145	85	0.116	74	0.090	73	0.067	72	0.048	69	0.074	73	0.032	81
DCP12	.501	0.901	0.393	69	0.177	56	0.106	52	0.092	44	0.083	46	0.078	42	0.049	39	0.070	33	0.029	59
DCP13	.600	0.746	0.361	58	0.159	45	0.094	41	0.082	22	0.076	24	0.078	26	0.036	5	0.065	11	0.031	32
DCP14	.701	0.636	0.309	46	0.139	36	0.079	11	0.071	7	0.069	359	0.071	355	0.033	339	0.044	345	0.027	354
DCP15	.800	0.463	0.254	31	0.129	29	0.069	356	0.055	8	0.063	341	0.056	337	0.028	296	0.030	322	0.017	317
DCP16	.900	0.184	0.159	25	0.098	10	0.048	355	0.025	354	0.030	330	0.036	320	0.012	305	0.023	304	0.005	296
DCP17	.969	0.041	0.064	31	0.046	25	0.011	14	0.011	3	0.016	334	0.011	334	0.008	299	0.009	344	0.012	321

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.18	0.118	0.298	5.07	0.0	19.95	12009.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
100.4 (329.3)	26607. (555.7)	0.48E 07	-0.201	1.591	18.52	-0.00417	3.389	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.946	5.065	0	0.215	6	0.059	245	0.012	251	0.013	8	0.031	298	0.030	193	0.002	105	0.008	21
CN		1.058	0.315	100	0.048	133	0.060	150	0.034	167	0.032	162	0.028	177	0.019	184	0.003	146	0.002	171
CM		-0.085	0.065	234	0.022	242	0.018	274	0.011	294	0.010	307	0.008	335	0.003	349	0.001	241	0.002	349
DCP 1	.010	2.814	1.651	161	0.585	228	0.224	248	0.229	297	0.113	11	0.039	54	0.055	91	0.043	111	0.023	148
DCP 2	.020	2.480	1.197	161	0.464	232	0.193	258	0.159	307	0.067	2	0.038	53	0.021	106	0.045	121	0.018	228
DCP 3	.030	2.276	0.936	155	0.481	227	0.205	283	0.096	325	0.029	19	0.032	59	0.031	134	0.033	132	0.018	213
DCP 4	.049	2.913	0.843	164	0.144	221	0.251	228	0.056	240	0.066	257	0.013	291	0.015	136	0.028	58	0.037	32
DCP 5	.074	2.433	0.616	144	0.117	253	0.187	221	0.026	196	0.041	226	0.006	181	0.017	153	0.029	56	0.030	4
DCP 6	.099	2.119	0.514	126	0.090	229	0.097	213	0.041	202	0.043	202	0.012	155	0.026	154	0.017	69	0.012	42
DCP 7	.149	1.734	0.412	99	0.101	150	0.090	190	0.058	187	0.031	193	0.013	185	0.015	213	0.009	148	0.012	29
DCP 8	.200	1.471	0.408	109	0.132	157	0.118	178	0.056	212	0.058	206	0.040	239	0.027	230	0.010	256	0.008	340
DCP 9	.250	1.367	0.428	104	0.125	148	0.133	153	0.085	192	0.067	188	0.056	218	0.041	218	0.027	265	0.005	343
DCP10	.300	1.255	0.399	98	0.122	141	0.119	149	0.081	190	0.059	192	0.049	212	0.032	210	0.023	250	0.009	298
DCP11	.399	1.147	0.391	94	0.101	130	0.117	139	0.077	187	0.050	187	0.057	201	0.034	214	0.021	250	0.006	239
DCP12	.501	0.959	0.359	84	0.087	102	0.098	125	0.063	161	0.051	162	0.050	171	0.037	180	0.017	214	0.008	247
DCP13	.600	0.812	0.334	74	0.086	74	0.075	106	0.054	127	0.058	138	0.045	162	0.026	153	0.024	140	0.017	189
DCP14	.701	0.712	0.310	65	0.094	60	0.071	98	0.048	109	0.046	118	0.034	147	0.011	130	0.022	90	0.009	144
DCP15	.800	0.559	0.261	63	0.079	52	0.056	90	0.045	98	0.041	118	0.036	142	0.014	189	0.015	28	0.011	117
DCP16	.900	0.247	0.166	62	0.046	39	0.029	82	0.030	72	0.027	97	0.023	126	0.011	129	0.016	6	0.006	101
DCP17	.969	0.072	0.083	71	0.013	60	0.013	95	0.012	80	0.011	117	0.007	131	0.004	122	0.003	228	0.012	204

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.80	0.225	0.305	5.53	0.0	-0.01	12011.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
103.8 (340.4)	27952. (583.8)	0.49E 07	-0.049	0.494	5.58	-0.00091	0.782	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.009	5.529	0	0.305	5	0.105	298	0.044	238	0.043	107	0.038	60	0.023	197	0.012	239	0.004	89
CN		0.118	0.393	3	0.018	41	0.007	12	0.012	235	0.003	295	0.002	298	0.002	7	0.001	137	0.001	189
CM		-0.016	0.027	291	0.004	297	0.001	258	0.005	109	0.000	111	0.001	107	0.001	162	0.001	127	0.000	81
DCP 1	.010	-0.655	2.914	344	0.209	22	0.023	51	0.061	147	0.006	3	0.012	142	0.006	310	0.007	127	0.011	70
DCP 2	.020	-0.345	2.110	350	0.088	358	0.027	342	0.059	165	0.005	308	0.009	150	0.008	301	0.008	173	0.009	199
DCP 3	.030	-0.028	1.754	349	0.062	342	0.029	334	0.039	164	0.009	293	0.009	128	0.005	298	0.006	132	0.006	158
DCP 4	.049	0.082	1.427	351	0.047	345	0.018	329	0.039	159	0.010	297	0.005	112	0.004	303	0.004	77	0.006	110
DCP 5	.074	0.253	1.138	351	0.044	355	0.013	352	0.034	153	0.005	280	0.006	141	0.005	34	0.006	136	0.004	62
DCP 6	.099	0.349	0.967	353	0.043	4	0.017	343	0.035	162	0.010	285	0.003	127	0.005	342	0.001	119	0.007	152
DCP 7	.149	0.227	0.730	355	0.034	16	0.017	342	0.028	145	0.007	251	0.007	135	0.005	125	0.009	110	0.000	268
DCP 8	.200	0.195	0.599	2	0.028	31	0.012	16	0.030	159	0.008	327	0.004	122	0.005	63	0.008	109	0.007	189
DCP 9	.250	0.165	0.516	1	0.027	14	0.005	33	0.018	242	0.003	150	0.005	22	0.001	254	0.009	113	0.002	110
DCP10	.300	0.186	0.435	3	0.019	38	0.008	7	0.017	247	0.006	340	0.003	20	0.001	213	0.003	134	0.003	345
DCP11	.399	0.181	0.351	14	0.021	60	0.010	20	0.021	268	0.004	266	0.006	354	0.006	53	0.003	200	0.004	163
DCP12	.501	0.114	0.271	22	0.020	71	0.006	63	0.021	278	0.002	208	0.005	301	0.004	71	0.008	266	0.002	310
DCP13	.600	0.149	0.215	28	0.014	89	0.012	19	0.023	279	0.002	29	0.012	298	0.004	27	0.003	265	0.004	265
DCP14	.701	0.190	0.153	37	0.018	91	0.007	26	0.012	274	0.004	275	0.004	247	0.006	319	0.001	72	0.002	126
DCP15	.800	0.092	0.101	46	0.015	103	0.005	77	0.015	281	0.005	296	0.006	272	0.007	332	0.005	354	0.006	210
DCP16	.900	-0.083	0.046	70	0.010	98	0.002	236	0.014	254	0.002	316	0.008	149	0.004	261	0.001	268	0.000	221
DCP17	.969	-0.042	0.020	163	0.004	171	0.007	182	0.017	311	0.005	129	0.007	334	0.004	123	0.001	316	0.007	6

REPRODUCIBILITY OF THE ORIGINAL PAGE IS P

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.79	0.227	0.303	5.52	0.0	2.43	12011.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
102.6 (336.5)	27435. (573.0)	0.49E 07	-0.046	0.742	8.02	-0.00890	0.768	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.433	5.524	0	0.314	4	0.109	297	0.017	199	0.036	90	0.031	68	0.029	213	0.014	208	0.009	126
CN		0.349	0.392	3	0.022	27	0.006	12	0.013	178	0.002	346	0.003	118	0.003	270	0.002	147	0.001	212
CM		-0.012	0.027	292	0.003	272	0.002	307	0.005	7	0.002	185	0.001	283	0.001	90	0.001	311	0.001	25
DCP 1	.010	0.981	2.707	344	0.141	0	0.038	335	0.012	89	0.008	238	0.005	126	0.005	274	0.003	176	0.009	29
DCP 2	.020	0.841	2.110	349	0.106	4	0.060	332	0.009	77	0.012	160	0.007	97	0.005	214	0.002	242	0.009	0
DCP 3	.030	0.966	1.775	349	0.082	356	0.049	330	0.007	93	0.001	114	0.006	205	0.008	131	0.002	84	0.006	281
DCP 4	.049	0.918	1.463	350	0.059	352	0.023	350	0.010	68	0.007	208	0.003	2	0.012	253	0.006	209	0.005	16
DCP 5	.074	0.918	1.153	351	0.049	357	0.022	339	0.006	82	0.010	216	0.004	309	0.009	225	0.004	158	0.004	30
DCP 6	.099	0.915	0.984	353	0.048	10	0.019	339	0.011	58	0.006	223	0.004	275	0.004	175	0.007	203	0.003	187
DCP 7	.149	0.651	0.735	355	0.030	5	0.012	11	0.003	198	0.005	48	0.008	84	0.007	90	0.005	138	0.004	25
DCP 8	.200	0.543	0.605	1	0.024	14	0.012	351	0.002	91	0.001	248	0.000	203	0.010	326	0.007	289	0.001	326
DCP 9	.250	0.459	0.521	1	0.032	14	0.007	21	0.018	181	0.004	161	0.003	193	0.004	264	0.001	164	0.005	226
DCP10	.300	0.443	0.437	2	0.028	31	0.012	356	0.020	172	0.001	212	0.004	120	0.005	286	0.002	163	0.004	108
DCP11	.399	0.387	0.349	14	0.028	55	0.008	39	0.021	190	0.003	183	0.009	123	0.004	270	0.008	85	0.005	164
DCP12	.501	0.262	0.270	22	0.021	53	0.009	16	0.013	186	0.005	295	0.005	142	0.001	278	0.003	155	0.004	299
DCP13	.600	0.254	0.206	29	0.013	21	0.006	40	0.011	173	0.009	337	0.006	168	0.011	282	0.004	205	0.008	272
DCP14	.701	0.267	0.154	37	0.017	72	0.011	116	0.019	179	0.005	353	0.004	304	0.003	254	0.007	110	0.004	126
DCP15	.800	0.140	0.100	49	0.010	62	0.003	88	0.015	165	0.008	10	0.008	69	0.006	281	0.003	345	0.004	154
DCP16	.900	-0.070	0.043	62	0.014	98	0.009	151	0.020	198	0.005	78	0.002	199	0.001	296	0.008	200	0.008	204
DCP17	.969	-0.045	0.022	150	0.008	326	0.004	235	0.023	197	0.011	359	0.006	58	0.009	134	0.006	75	0.002	271

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.75	0.230	0.300	5.54	0.0	5.01	12011.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.5 (332.9)	26947. (562.8)	0.48E 07	-0.043	0.972	10.59	-0.00894	0.789	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.014	5.535	0	0.313	5	0.096	297	0.040	27	0.032	78	0.019	79	0.026	193	0.006	201	0.007	93
CN		0.596	0.388	4	0.024	31	0.009	358	0.011	80	0.003	269	0.002	22	0.002	90	0.001	180	0.003	214
CM		-0.009	0.028	293	0.003	264	0.001	235	0.005	248	0.001	91	0.001	152	0.001	265	0.000	209	0.001	16
DCP 1	.010	2.546	2.603	344	0.137	11	0.075	316	0.049	204	0.007	86	0.007	115	0.007	30	0.007	265	0.004	229
DCP 2	.020	2.110	2.110	350	0.095	3	0.022	325	0.022	201	0.008	13	0.010	172	0.004	6	0.010	208	0.003	264
DCP 3	.030	2.022	1.777	349	0.079	3	0.019	322	0.009	158	0.008	319	0.005	163	0.003	212	0.007	188	0.002	249
DCP 4	.049	1.799	1.471	350	0.060	359	0.023	329	0.014	193	0.008	310	0.009	190	0.003	258	0.009	180	0.006	226
DCP 5	.074	1.629	1.161	351	0.054	4	0.022	332	0.014	205	0.006	328	0.005	172	0.001	238	0.005	182	0.005	214
DCP 6	.099	1.514	0.976	353	0.050	8	0.016	334	0.015	199	0.010	351	0.003	132	0.003	286	0.008	129	0.003	230
DCP 7	.149	1.110	0.719	356	0.035	14	0.020	336	0.011	195	0.008	247	0.007	181	0.001	270	0.007	88	0.007	289
DCP 8	.200	0.912	0.599	2	0.034	27	0.007	346	0.017	181	0.006	348	0.002	213	0.006	246	0.004	306	0.005	228
DCP 9	.250	0.768	0.516	2	0.031	17	0.016	21	0.019	31	0.004	120	0.001	332	0.003	185	0.002	27	0.004	312
DCP10	.300	0.711	0.432	5	0.028	33	0.013	359	0.016	41	0.007	185	0.015	77	0.002	50	0.002	274	0.005	154
DCP11	.399	0.601	0.349	17	0.027	51	0.009	10	0.021	62	0.008	207	0.009	56	0.005	108	0.004	144	0.003	278
DCP12	.501	0.428	0.274	23	0.016	55	0.011	37	0.016	73	0.007	260	0.007	22	0.006	91	0.003	271	0.003	264
DCP13	.600	0.377	0.215	29	0.024	52	0.004	345	0.015	75	0.002	87	0.006	52	0.002	90	0.005	47	0.004	205
DCP14	.701	0.353	0.144	41	0.020	71	0.007	8	0.020	76	0.004	330	0.015	268	0.004	73	0.002	48	0.009	164
DCP15	.800	0.192	0.101	53	0.017	59	0.007	43	0.018	65	0.009	246	0.010	296	0.004	67	0.003	60	0.007	150
DCP16	.900	-0.040	0.044	70	0.009	55	0.004	50	0.013	33	0.009	42	0.005	34	0.008	75	0.001	2	0.010	276
DCP17	.969	-0.051	0.026	154	0.005	283	0.001	37	0.026	113	0.017	270	0.003	90	0.004	141	0.001	284	0.008	183

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.79	0.231	0.299	5.53	0.0	7.50	12011.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.0 (331.3)	26765. (559.0)	0.48E 07	-0.039	1.193	13.05	-0.00103	0.862	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.503	5.533	0	0.315	6	0.093	293	0.038	37	0.029	86	0.014	81	0.024	204	0.010	253	0.008	124
CN		0.820	0.374	6	0.028	26	0.005	52	0.017	62	0.005	278	0.003	327	0.001	247	0.002	222	0.002	175
CM		-0.004	0.031	293	0.002	262	0.002	295	0.005	227	0.001	107	0.002	139	0.001	234	0.000	331	0.001	330
DCP 1	.010	4.010	2.482	345	0.151	353	0.042	163	0.115	92	0.058	302	0.006	265	0.020	239	0.008	158	0.011	235
DCP 2	.020	3.287	2.025	350	0.115	20	0.057	337	0.015	156	0.016	257	0.002	70	0.013	261	0.008	127	0.006	327
DCP 3	.030	3.036	1.758	350	0.088	359	0.024	345	0.004	100	0.010	258	0.013	166	0.009	221	0.004	155	0.003	234
DCP 4	.049	2.641	1.444	351	0.089	10	0.033	339	0.014	128	0.006	260	0.015	157	0.010	238	0.002	254	0.001	57
DCP 5	.074	2.295	1.136	352	0.066	12	0.022	332	0.014	125	0.006	246	0.008	149	0.003	284	0.013	270	0.005	41
DCP 6	.099	2.067	0.948	354	0.055	9	0.021	343	0.017	121	0.009	220	0.006	127	0.007	241	0.009	274	0.004	33
DCP 7	.149	1.524	0.715	357	0.049	19	0.011	332	0.018	124	0.009	319	0.006	29	0.009	194	0.008	250	0.004	288
DCP 8	.200	1.248	0.585	4	0.036	20	0.015	26	0.011	120	0.004	204	0.008	244	0.011	286	0.006	174	0.006	206
DCP 9	.250	1.061	0.505	4	0.028	31	0.004	340	0.017	34	0.006	184	0.001	55	0.006	216	0.006	114	0.016	231
DCP10	.300	0.953	0.414	8	0.035	28	0.003	18	0.017	54	0.004	295	0.002	98	0.006	203	0.004	268	0.004	143
DCP11	.399	0.792	0.335	20	0.037	47	0.012	87	0.020	70	0.006	265	0.008	339	0.004	276	0.004	229	0.005	94
DCP12	.501	0.573	0.265	28	0.022	40	0.009	66	0.017	48	0.007	257	0.006	336	0.004	61	0.009	336	0.004	219
DCP13	.600	0.482	0.206	39	0.016	41	0.008	127	0.023	49	0.008	310	0.011	11	0.007	103	0.006	148	0.004	148
DCP14	.701	0.426	0.145	50	0.020	44	0.009	96	0.023	51	0.009	274	0.008	323	0.007	24	0.003	34	0.004	106
DCP15	.800	0.230	0.104	61	0.011	54	0.012	87	0.023	56	0.003	317	0.009	279	0.002	258	0.002	244	0.002	27
DCP16	.900	-0.029	0.053	70	0.006	73	0.010	147	0.011	47	0.005	221	0.006	277	0.009	20	0.008	164	0.008	173
DCP17	.969	-0.057	0.016	122	0.005	289	0.003	304	0.016	48	0.007	348	0.004	104	0.009	156	0.003	146	0.002	288

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.76	0.232	0.298	5.51	0.0	10.00	12011.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.6 (330.1)	26617. (555.9)	0.48E 07	-0.067	1.410	15.18	-0.00075	0.630	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.003	5.505	0	0.340	4	0.105	269	0.036	256	0.030	69	0.019	60	0.022	192	0.005	292	0.004	152
CN		0.967	0.446	20	0.030	228	0.040	34	0.036	257	0.024	165	0.022	46	0.014	277	0.008	156	0.004	343
CM		-0.006	0.021	243	0.027	351	0.016	202	0.012	55	0.004	322	0.004	198	0.005	60	0.003	306	0.002	155
DCP 1	.010	4.385	1.706	16	0.975	11	0.561	270	0.296	181	0.210	105	0.082	357	0.075	192	0.095	111	0.094	50
DCP 2	.020	3.519	1.399	27	0.897	17	0.557	275	0.310	172	0.183	90	0.085	37	0.075	16	0.095	295	0.091	197
DCP 3	.030	3.116	1.247	36	0.862	5	0.432	256	0.133	155	0.114	143	0.102	55	0.113	327	0.063	264	0.067	213
DCP 4	.049	3.117	1.377	6	0.161	351	0.034	261	0.033	55	0.013	328	0.008	280	0.011	119	0.003	103	0.009	240
DCP 5	.074	2.653	1.081	8	0.134	349	0.020	233	0.025	25	0.012	287	0.004	275	0.011	138	0.008	25	0.004	274
DCP 6	.099	2.350	0.942	11	0.128	338	0.023	202	0.036	27	0.008	230	0.004	131	0.010	126	0.010	326	0.010	252
DCP 7	.149	1.746	0.757	16	0.122	312	0.058	151	0.052	10	0.021	244	0.003	87	0.004	206	0.011	15	0.005	228
DCP 8	.200	1.477	0.726	17	0.138	269	0.104	114	0.075	355	0.033	238	0.018	124	0.006	75	0.007	319	0.006	109
DCP 9	.250	1.313	0.715	10	0.195	229	0.159	86	0.067	312	0.044	213	0.023	134	0.031	15	0.026	253	0.004	145
DCP10	.300	1.174	0.624	9	0.192	220	0.146	78	0.085	299	0.050	201	0.043	83	0.030	319	0.023	167	0.014	7
DCP11	.399	0.960	0.496	18	0.145	212	0.132	71	0.084	295	0.060	195	0.042	72	0.027	312	0.039	198	0.007	111
DCP12	.501	0.679	0.361	25	0.114	179	0.115	34	0.094	259	0.066	159	0.062	30	0.040	283	0.029	159	0.015	29
DCP13	.600	0.528	0.292	37	0.087	172	0.102	17	0.080	235	0.030	129	0.031	36	0.033	268	0.026	158	0.017	17
DCP14	.701	0.437	0.227	53	0.068	161	0.072	359	0.059	211	0.017	124	0.022	1	0.029	248	0.016	144	0.010	6
DCP15	.800	0.250	0.138	51	0.069	149	0.048	330	0.035	196	0.013	123	0.015	31	0.026	211	0.019	77	0.018	275
DCP16	.900	0.001	0.070	17	0.054	128	0.033	312	0.033	209	0.011	87	0.011	290	0.016	170	0.007	60	0.015	283
DCP17	.969	-0.040	0.022	17	0.017	164	0.015	311	0.023	213	0.015	40	0.007	306	0.008	107	0.005	8	0.008	40

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.71	0.232	0.297	5.43	0.0	12.49	12011.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.4 (329.5)	26530. (554.1)	0.48E 07	-0.201	1.813	17.98	0.00049	-0.156	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.488	5.428	0	0.415	9	0.173	274	0.070	337	0.042	73	0.010	80	0.024	238	0.006	76	0.006	121
CN		1.044	0.589	35	0.138	288	0.069	169	0.020	105	0.026	359	0.018	277	0.006	251	0.005	264	0.009	215
CM		-0.033	0.067	178	0.057	27	0.028	287	0.012	178	0.010	130	0.009	34	0.005	295	0.003	219	0.002	144
DCP 1	.010	3.968	1.514	90	1.277	36	0.192	17	0.356	349	0.284	295	0.236	266	0.171	223	0.082	194	0.071	124
DCP 2	.020	3.438	1.412	79	1.035	34	0.133	339	0.187	355	0.216	305	0.220	265	0.174	216	0.108	180	0.113	158
DCP 3	.030	3.062	1.220	83	0.932	38	0.200	357	0.231	339	0.228	284	0.156	244	0.139	212	0.110	168	0.079	142
DCP 4	.049	3.129	1.172	50	0.643	18	0.290	292	0.195	214	0.069	152	0.052	142	0.073	98	0.072	26	0.049	328
DCP 5	.074	2.685	1.052	50	0.510	3	0.207	265	0.129	189	0.049	127	0.035	108	0.050	59	0.045	343	0.036	278
DCP 6	.099	2.412	1.039	48	0.462	347	0.185	240	0.102	160	0.051	128	0.033	80	0.042	32	0.031	327	0.020	291
DCP 7	.149	1.890	1.011	41	0.407	321	0.155	223	0.109	183	0.073	109	0.026	61	0.030	37	0.030	338	0.031	277
DCP 8	.200	1.600	0.958	41	0.391	317	0.175	228	0.126	173	0.056	127	0.061	82	0.069	6	0.046	323	0.041	272
DCP 9	.250	1.433	0.975	32	0.395	294	0.193	205	0.123	150	0.066	88	0.077	43	0.079	321	0.045	269	0.051	235
DCP10	.300	1.292	0.887	29	0.372	282	0.196	191	0.126	127	0.062	66	0.080	18	0.083	307	0.067	257	0.079	194
DCP11	.399	1.097	0.765	31	0.310	276	0.178	189	0.138	132	0.111	55	0.105	342	0.084	284	0.072	225	0.069	178
DCP12	.501	0.825	0.629	26	0.265	249	0.164	156	0.109	81	0.096	14	0.118	300	0.088	219	0.066	158	0.060	93
DCP13	.600	0.668	0.503	22	0.252	223	0.150	123	0.096	40	0.099	336	0.109	256	0.090	171	0.068	93	0.049	30
DCP14	.701	0.546	0.366	19	0.225	201	0.151	93	0.112	350	0.077	283	0.085	203	0.057	106	0.047	24	0.039	311
DCP15	.800	0.355	0.266	4	0.196	185	0.113	80	0.097	321	0.057	264	0.070	162	0.045	66	0.027	359	0.028	289
DCP16	.900	0.067	0.153	348	0.089	178	0.068	75	0.052	295	0.036	249	0.039	152	0.039	46	0.024	312	0.022	219
DCP17	.969	-0.011	0.057	347	0.036	186	0.032	77	0.037	256	0.018	244	0.022	151	0.013	58	0.015	345	0.325	325

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.233	0.296	5.39	0.0	15.03	12011.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.0 (328.0)	26358. (550.5)	0.48E 07	-0.260	2.033	19.83	0.00045	-0.371	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.027	5.390	0	0.391	18	0.189	313	0.071	77	0.037	107	0.016	9	0.016	168	0.031	220	0.011	226
CN		1.177	0.608	42	0.130	334	0.069	249	0.034	203	0.012	196	0.013	106	0.008	96	0.008	66	0.014	34
CM		-0.041	0.114	177	0.063	59	0.033	343	0.006	278	0.003	249	0.009	216	0.005	117	0.005	64	0.002	284
DCP 1	.010	4.013	1.980	124	0.967	67	0.349	87	0.426	96	0.365	49	0.213	50	0.149	12	0.078	30	0.054	322
DCP 2	.020	3.552	1.634	113	0.898	63	0.194	69	0.244	101	0.258	51	0.184	43	0.193	16	0.122	10	0.124	351
DCP 3	.030	3.144	1.450	117	0.776	69	0.340	89	0.205	50	0.190	48	0.153	13	0.117	18	0.114	355	0.082	343
DCP 4	.049	3.278	0.933	87	0.716	62	0.241	11	0.136	14	0.167	331	0.151	283	0.091	249	0.074	239	0.082	205
DCP 5	.074	2.867	0.983	74	0.536	37	0.150	335	0.090	354	0.156	302	0.141	250	0.087	203	0.056	191	0.064	164
DCP 6	.099	2.594	1.067	68	0.504	17	0.159	312	0.058	324	0.133	293	0.137	243	0.094	191	0.058	171	0.049	157
DCP 7	.149	2.039	1.071	58	0.436	3	0.267	309	0.148	239	0.070	240	0.084	226	0.080	176	0.061	130	0.046	82
DCP 8	.200	1.723	0.973	57	0.425	11	0.313	308	0.133	236	0.086	247	0.080	215	0.072	181	0.053	143	0.044	122
DCP 9	.250	1.566	0.969	48	0.395	354	0.300	292	0.156	243	0.122	227	0.110	189	0.107	146	0.093	107	0.091	60
DCP10	.300	1.411	0.873	43	0.342	349	0.289	282	0.177	234	0.147	197	0.110	158	0.103	108	0.089	71	0.089	19
DCP11	.399	1.245	0.820	39	0.267	332	0.257	274	0.197	227	0.160	177	0.135	128	0.123	79	0.094	35	0.071	358
DCP12	.501	1.007	0.749	27	0.246	292	0.208	234	0.159	181	0.122	125	0.129	82	0.127	21	0.098	333	0.064	281
DCP13	.600	0.849	0.686	19	0.279	261	0.219	193	0.124	132	0.097	73	0.102	41	0.108	329	0.071	270	0.048	203
DCP14	.701	0.704	0.554	11	0.295	235	0.219	155	0.112	76	0.080	19	0.087	344	0.075	255	0.047	209	0.048	106
DCP15	.800	0.461	0.412	359	0.249	222	0.205	132	0.099	30	0.077	322	0.095	298	0.047	211	0.028	156	0.027	52
DCP16	.900	0.148	0.243	347	0.133	209	0.107	102	0.052	349	0.036	295	0.029	331	0.033	200	0.027	128	0.025	337
DCP17	.969	0.035	0.123	343	0.066	213	0.067	92	0.046	330	0.024	233	0.008	23	0.016	263	0.022	216	0.013	117

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.77	0.234	0.296	5.37	0.0	17.45	12011.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
99.8 (327.3)	26286. (549.0)	0.48E 07	-0.313	2.195	20.86	0.00013	-0.111	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.454	5.372	0	0.326	21	0.145	357	0.148	149	0.022	191	0.019	15	0.017	177	0.016	314	0.014	187
CN		1.240	0.656	49	0.127	16	0.095	310	0.021	212	0.026	306	0.024	228	0.008	267	0.008	218	0.013	205
CM		-0.080	0.141	182	0.051	98	0.038	47	0.022	321	0.003	326	0.008	326	0.007	221	0.003	232	0.002	5
DCP 1	.010	3.791	2.378	137	0.764	103	0.424	130	0.291	177	0.322	164	0.198	166	0.131	152	0.071	174	0.058	128
DCP 2	.020	3.430	2.033	129	0.687	95	0.327	99	0.084	222	0.210	168	0.153	179	0.204	172	0.142	183	0.155	167
DCP 3	.030	2.964	1.772	127	0.558	129	0.440	100	0.207	160	0.155	126	0.194	139	0.099	143	0.115	138	0.068	167
DCP 4	.049	3.335	1.037	102	0.943	94	0.252	78	0.225	62	0.183	18	0.098	17	0.076	12	0.069	4	0.057	8
DCP 5	.074	2.903	1.078	86	0.324	71	0.194	62	0.164	44	0.195	0	0.101	333	0.058	328	0.056	340	0.055	343
DCP 6	.099	2.631	1.188	78	0.300	51	0.215	37	0.140	35	0.212	357	0.127	322	0.079	296	0.045	313	0.036	309
DCP 7	.149	2.105	1.084	70	0.437	55	0.401	359	0.160	318	0.087	328	0.117	337	0.102	296	0.067	274	0.028	286
DCP 8	.200	1.800	1.003	68	0.457	52	0.376	352	0.158	311	0.063	347	0.107	333	0.080	312	0.066	294	0.057	295
DCP 9	.250	1.646	1.034	58	0.450	37	0.375	338	0.144	306	0.086	324	0.120	297	0.096	280	0.076	255	0.071	243
DCP10	.300	1.460	0.915	53	0.382	34	0.3[illegible]	335	0.191	295	0.133	292	0.121	257	0.106	241	0.073	221	0.075	200
DCP11	.399	1.336	0.913	44	0.285	19	0.318	326	0.184	281	0.158	276	0.155	235	0.119	208	0.094	196	0.081	169
DCP12	.501	1.122	0.890	31	0.249	336	0.284	286	0.171	229	0.136	226	0.156	183	0.125	135	0.087	122	0.063	95
DCP13	.600	0.954	0.831	21	0.266	303	0.260	248	0.179	181	0.085	171	0.113	147	0.111	87	0.077	61	0.030	359
DCP14	.701	0.779	0.669	11	0.249	270	0.241	209	0.178	137	0.075	96	0.067	84	0.083	21	0.043	3	0.033	287
DCP15	.800	0.528	0.510	2	0.231	255	0.197	181	0.168	108	0.079	48	0.034	17	0.058	321	0.007	324	0.006	166
DCP16	.900	0.196	0.263	355	0.103	245	0.078	173	0.098	89	0.036	28	0.026	21	0.043	326	0.015	290	0.013	180
DCP17	.969	0.050	0.116	356	0.061	226	0.050	142	0.060	71	0.020	297	0.029	142	0.033	37	0.033	333	0.023	248

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.75	0.234	0.295	5.35	0.0	19.94	12011.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
99.4 (326.2)	26090. (544.9)	0.48E 07	-0.346	2.182	22.32	-0.00069	0.572	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.936	5.352	0	0.241	14	0.086	79	0.144	196	0.013	340	0.009	86	0.014	180	0.022	124	0.008	289
CN		1.250	0.658	54	0.122	50	0.140	355	0.022	274	0.017	22	0.018	350	0.009	297	0.009	348	0.009	307
CM		-0.100	0.149	188	0.047	136	0.049	105	0.019	17	0.005	356	0.005	25	0.005	3	0.001	276	0.002	116
DCP 1	.010	3.406	2.280	138	0.803	160	0.271	149	0.355	221	0.286	241	0.162	247	0.118	244	0.059	264	0.051	246
DCP 2	.020	3.182	1.893	133	0.619	150	0.267	106	0.170	233	0.157	249	0.167	270	0.146	278	0.148	301	0.109	303
DCP 3	.030	2.875	1.561	134	0.634	171	0.241	133	0.222	210	0.149	236	0.121	231	0.109	265	0.098	295	0.062	296
DCP 4	.049	2.995	1.310	116	0.441	131	0.324	108	0.102	133	0.190	120	0.083	96	0.079	130	0.049	132	0.053	153
DCP 5	.074	2.648	1.102	99	0.338	123	0.282	76	0.078	116	0.156	95	0.099	81	0.067	82	0.042	116	0.058	114
DCP 6	.099	2.465	1.161	86	0.331	111	0.265	59	0.106	89	0.169	88	0.152	64	0.088	43	0.026	76	0.065	106
DCP 7	.149	2.041	1.052	73	0.423	88	0.324	38	0.135	31	0.122	54	0.097	31	0.048	47	0.056	52	0.052	42
DCP 8	.200	1.776	0.937	73	0.435	84	0.338	44	0.119	16	0.089	59	0.069	58	0.053	88	0.060	74	0.043	62
DCP 9	.250	1.652	0.941	64	0.456	70	0.388	28	0.167	1	0.121	17	0.095	25	0.087	9	0.071	3	0.042	345
DCP10	.300	1.520	0.876	56	0.402	62	0.389	21	0.194	353	0.149	355	0.105	338	0.086	336	0.066	331	0.045	323
DCP11	.399	1.409	0.919	47	0.318	45	0.370	13	0.182	343	0.169	334	0.126	330	0.098	309	0.079	303	0.072	285
DCP12	.501	1.189	0.910	35	0.274	8	0.326	336	0.151	296	0.131	286	0.122	275	0.100	250	0.065	238	0.065	228
DCP13	.600	1.001	0.856	27	0.271	337	0.302	303	0.159	241	0.098	232	0.089	227	0.081	206	0.058	167	0.030	153
DCP14	.701	0.827	0.716	17	0.240	305	0.267	271	0.180	195	0.096	158	0.095	146	0.067	137	0.039	96	0.015	48
DCP15	.800	0.598	0.518	11	0.176	287	0.193	251	0.166	170	0.104	126	0.053	95	0.027	59	0.024	17	0.004	311
DCP16	.900	0.261	0.289	5	0.088	253	0.079	234	0.076	143	0.045	109	0.036	131	0.034	89	0.022	345	0.013	337
DCP17	.969	0.089	0.143	10	0.062	251	0.047	203	0.070	116	0.035	24	0.025	233	0.045	168	0.036	87	0.041	2

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.07	0.333	0.310	5.95	0.0	0.03	12013.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
105.5 (346.0)	28733. (600.1)	0.50E 07	-0.062	0.465	6.04	-0.00086	0.775	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.035	5.953	0	0.520	343	0.151	203	0.077	136	0.016	189	0.016	27	0.010	223	0.018	97	0.006	41
CN		0.113	0.367	16	0.038	33	0.006	267	0.002	244	0.005	275	0.001	172	0.003	201	0.003	190	0.002	127
CM		-0.016	0.041	293	0.008	280	0.001	161	0.001	141	0.001	142	0.000	359	0.001	34	0.000	38	0.001	279
OCP 1	.010	-0.652	2.756	344	0.280	357	0.057	134	0.019	97	0.025	154	0.008	190	0.007	315	0.010	92	0.011	137
OCP 2	.020	-0.355	1.991	353	0.169	344	0.032	201	0.004	141	0.013	198	0.006	167	0.009	239	0.004	39	0.007	158
OCP 3	.030	-0.046	1.648	353	0.135	337	0.028	219	0.007	197	0.014	214	0.003	26	0.003	194	0.001	217	0.005	154
OCP 4	.049	0.067	1.336	355	0.108	340	0.026	207	0.008	174	0.011	176	0.007	262	0.006	100	0.006	212	0.007	20
OCP 5	.074	0.243	1.070	356	0.093	350	0.023	197	0.007	165	0.006	186	0.003	355	0.004	77	0.004	171	0.002	138
OCP 6	.099	0.335	0.924	359	0.080	355	0.022	231	0.006	131	0.012	209	0.002	18	0.005	147	0.003	316	0.004	175
OCP 7	.149	0.210	0.687	3	0.068	4	0.013	249	0.007	165	0.007	229	0.003	347	0.005	197	0.004	203	0.003	327
OCP 8	.200	0.186	0.567	14	0.052	26	0.013	286	0.007	257	0.011	296	0.004	151	0.003	86	0.004	193	0.006	180
OCP 9	.250	0.154	0.498	12	0.053	27	0.009	275	0.007	174	0.014	261	0.005	335	0.004	77	0.001	13	0.001	94
OCP10	.300	0.177	0.423	15	0.047	28	0.010	260	0.005	157	0.008	252	0.006	88	0.009	217	0.010	163	0.004	200
OCP11	.399	0.176	0.351	35	0.047	58	0.012	308	0.008	166	0.008	313	0.003	246	0.004	201	0.011	216	0.007	187
OCP12	.501	0.116	0.293	42	0.046	65	0.010	306	0.004	231	0.006	262	0.003	187	0.004	17	0.011	153	0.002	166
OCP13	.600	0.140	1.240	54	0.042	72	0.004	293	0.015	306	0.001	137	0.006	156	0.009	201	0.005	133	0.004	216
OCP14	.701	0.184	0.191	62	0.037	70	0.004	286	0.001	117	0.007	323	0.003	186	0.004	18	0.004	254	0.005	123
OCP15	.800	0.082	0.137	74	0.026	86	0.008	347	0.010	332	0.010	333	0.004	31	0.006	203	0.005	321	0.004	17
OCP16	.900	-0.075	0.079	101	0.020	100	0.005	319	0.004	317	0.005	328	0.004	267	0.012	226	0.002	304	0.000	69
OCP17	.969	-0.031	0.030	176	0.003	197	0.009	126	0.006	94	0.005	221	0.007	176	0.003	141	0.006	197	0.005	176

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.14	0.340	0.306	5.96	0.0	2.47	12013.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.AMAX	AERO DAMP	TDR	EXT DAMP
103.7 (340.1)	27948. (583.7)	0.49E 07	-0.056	0.717	7.79	-0.00086	0.763	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.472	5.955	0	0.508	343	0.148	190	0.069	134	0.026	336	0.014	2	0.025	193	0.014	120	0.001	145
CN		0.335	0.374	65	0.038	33	0.010	261	0.004	258	0.005	311	0.000	244	0.004	199	0.003	93	0.001	60
CM		-0.012	0.041	293	0.007	279	0.002	162	0.002	112	0.001	147	0.000	127	0.001	359	0.001	232	0.001	339
OCP 1	.010	0.864	2.581	344	0.207	340	0.052	172	0.011	110	0.018	196	0.007	111	0.003	264	0.006	306	0.003	279
OCP 2	.020	0.760	2.000	353	0.154	348	0.034	247	0.004	49	0.010	209	0.002	63	0.011	193	0.001	53	0.010	5
OCP 3	.030	0.906	1.689	352	0.132	345	0.028	222	0.009	104	0.014	238	0.006	235	0.014	135	0.003	117	0.006	231
OCP 4	.049	0.875	1.392	354	0.111	343	0.038	223	0.011	147	0.005	328	0.004	290	0.009	158	0.006	146	0.007	71
OCP 5	.074	0.885	1.105	355	0.088	349	0.030	222	0.007	157	0.009	282	0.003	135	0.004	206	0.006	190	0.007	45
OCP 6	.099	0.884	0.930	358	0.074	2	0.025	237	0.003	30	0.011	310	0.000	120	0.008	211	0.005	166	0.006	51
OCP 7	.149	0.623	0.693	3	0.061	2	0.022	224	0.006	207	0.006	2	0.004	96	0.005	322	0.004	136	0.006	23
OCP 8	.200	0.514	0.573	13	0.057	30	0.020	261	0.005	261	0.007	351	0.010	206	0.010	224	0.006	79	0.006	9
OCP 9	.250	0.440	0.516	13	0.054	25	0.017	265	0.010	220	0.008	254	0.005	64	0.009	162	0.008	173	0.006	301
OCP10	.300	0.431	0.437	16	0.056	26	0.011	228	0.008	180	0.012	304	0.005	155	0.007	264	0.005	57	0.004	251
OCP11	.399	0.378	0.370	34	0.056	55	0.008	269	0.004	237	0.004	340	0.004	279	0.003	281	0.005	59	0.002	283
OCP12	.501	0.255	0.299	42	0.046	56	0.004	287	0.009	236	0.001	107	0.004	321	0.008	174	0.005	87	0.002	212
OCP13	.600	0.242	0.243	51	0.035	70	0.014	293	0.009	200	0.008	284	0.003	93	0.004	180	0.007	152	0.010	75
OCP14	.701	0.258	0.186	61	0.031	72	0.013	296	0.019	276	0.004	311	0.007	322	0.013	215	0.003	349	0.007	108
OCP15	.800	0.126	0.139	74	0.024	69	0.008	310	0.007	334	0.002	335	0.009	114	0.001	98	0.005	203	0.006	187
OCP16	.900	-0.058	0.070	101	0.022	121	0.007	53	0.007	9	0.009	327	0.011	247	0.007	23	0.011	47	0.004	318
OCP17	.969	-0.035	0.039	157	0.010	126	0.010	9	0.002	8	0.009	351	0.009	354	0.010	156	0.010	13	0.006	226

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.15	0.343	0.303	5.95	0.0	5.02	12013.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
102.7 (336.8)	27474. (573.8)	0.49E 07	-0.054	0.965	10.64	-0.00091	0.796	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.020	5.947	0	0.498	342	0.137	191	0.060	129	0.030	334	0.019	59	0.020	193	0.013	117	0.003	286
CN		0.572	0.366	17	0.037	33	0.013	258	0.003	210	0.005	310	0.003	145	0.003	56	0.001	228	0.002	351
CM		-0.008	0.044	294	0.097	277	0.003	115	0.001	136	0.001	107	0.001	320	0.001	196	0.001	121	0.001	120
DCP 1	.010	2.454	2.505	344	0.196	344	0.016	219	0.031	195	0.041	175	0.024	49	0.005	307	0.013	56	0.011	329
DCP 2	.020	2.001	2.025	353	0.163	347	0.045	173	0.002	79	0.020	210	0.013	49	0.006	56	0.012	78	0.005	328
DCP 3	.030	1.930	1.710	352	0.140	346	0.034	175	0.008	54	0.017	236	0.005	1	0.006	340	0.005	9	0.004	346
DCP 4	.049	1.747	1.414	354	0.109	349	0.024	203	0.004	267	0.006	311	0.009	258	0.010	116	0.002	140	0.007	88
DCP 5	.074	1.571	1.116	356	0.087	345	0.016	186	0.002	150	0.008	316	0.006	251	0.004	100	0.006	134	0.006	7
DCP 6	.099	1.463	0.935	359	0.081	0	0.018	192	0.001	246	0.005	359	0.006	241	0.011	76	0.004	146	0.006	70
DCP 7	.149	1.058	0.699	3	0.062	10	0.020	235	0.005	156	0.009	251	0.006	251	0.008	159	0.004	150	0.004	283
DCP 8	.200	0.872	0.574	14	0.056	24	0.017	234	0.007	164	0.004	345	0.004	256	0.009	343	0.004	152	0.004	100
DCP 9	.250	0.739	0.502	14	0.057	27	0.021	273	0.014	191	0.009	265	0.004	116	0.003	113	0.008	121	0.009	306
DCP10	.300	0.669	0.426	17	0.051	35	0.019	248	0.009	202	0.009	284	0.007	78	0.007	116	0.005	186	0.005	65
DCP11	.399	0.583	0.361	37	0.045	62	0.013	251	0.008	186	0.010	341	0.009	119	0.002	154	0.005	169	0.005	31
DCP12	.501	0.414	0.301	45	0.036	54	0.016	274	0.002	255	0.012	351	0.006	219	0.008	66	0.004	286	0.003	297
DCP13	.600	0.353	0.249	56	0.037	70	0.018	274	0.009	192	0.011	306	0.004	104	0.013	41	0.007	354	0.016	292
DCP14	.701	0.344	0.184	67	0.030	82	0.018	300	0.005	277	0.004	283	0.005	179	0.005	296	0.007	286	0.007	176
DCP15	.800	0.176	0.141	80	0.031	77	0.018	304	0.006	356	0.003	234	0.009	146	0.002	323	0.005	226	0.001	316
DCP16	.900	-0.044	0.077	102	0.013	93	0.007	189	0.011	324	0.006	23	0.009	151	0.002	38	0.003	314	0.006	32
DCP17	.969	-0.046	0.028	136	0.006	26	0.015	303	0.008	89	0.006	59	0.007	35	0.002	24	0.009	46	0.005	323

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.22	0.344	0.303	5.94	0.0	7.49	12013.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
102.4 (336.0)	27416. (572.6)	0.49E 07	-0.053	1.173	12.51	-0.00102	0.892	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.493	5.939	0	0.517	342	0.117	198	0.065	134	0.026	342	0.023	89	0.021	207	0.007	107	0.006	308
CN		0.786	0.371	20	0.043	34	0.009	285	0.003	304	0.005	307	0.004	192	0.003	324	0.004	171	0.002	137
CM		-0.001	0.048	291	0.107	278	0.002	132	0.001	143	0.001	185	0.001	17	0.002	167	0.001	23	0.001	3
DCP 1	.010	3.877	2.488	345	0.235	335	0.079	160	0.104	59	0.074	291	0.018	246	0.029	22	0.012	195	0.015	195
DCP 2	.020	3.150	1.957	353	0.162	3	0.026	316	0.021	235	0.023	240	0.014	183	0.006	267	0.008	171	0.009	295
DCP 3	.030	2.920	1.697	353	0.141	349	0.009	229	0.013	198	0.006	236	0.013	142	0.005	264	0.009	151	0.007	23
DCP 4	.049	2.562	1.402	355	0.124	354	0.015	240	0.012	225	0.008	295	0.010	164	0.008	266	0.002	99	0.006	47
DCP 5	.074	2.217	1.103	356	0.103	359	0.010	262	0.005	225	0.004	294	0.008	154	0.002	319	0.006	114	0.006	82
DCP 6	.099	1.998	0.928	0	0.091	5	0.011	288	0.009	189	0.010	284	0.003	178	0.001	253	0.002	105	0.006	72
DCP 7	.149	1.462	0.708	4	0.079	13	0.002	262	0.006	142	0.003	279	0.006	192	0.011	152	0.012	155	0.008	108
DCP 8	.200	1.200	0.573	14	0.067	29	0.011	256	0.013	259	0.005	308	0.009	258	0.009	310	0.009	91	0.005	170
DCP 9	.250	1.022	0.505	16	0.055	19	0.009	253	0.006	305	0.004	235	0.004	179	0.002	270	0.002	92	0.009	315
DCP10	.300	0.918	0.426	20	0.060	20	0.006	254	0.008	285	0.006	329	0.005	139	0.001	24	0.003	303	0.010	66
DCP11	.399	0.768	0.361	39	0.051	52	0.011	278	0.010	303	0.003	329	0.004	247	0.002	147	0.010	159	0.008	159
DCP12	.501	0.594	0.306	49	0.051	68	0.011	310	0.003	7	0.011	300	0.004	215	0.002	331	0.003	247	0.008	138
DCP13	.600	0.454	0.264	60	0.042	66	0.014	300	0.002	77	0.011	288	0.008	151	0.003	12	0.005	162	0.007	149
DCP14	.701	0.403	0.218	69	0.040	84	0.022	311	0.008	342	0.001	103	0.008	249	0.007	283	0.005	246	0.005	321
DCP15	.800	0.202	0.164	83	0.032	73	0.010	296	0.006	351	0.006	346	0.002	185	0.012	355	0.001	32	0.009	236
DCP16	.900	-0.035	0.090	94	0.004	125	0.005	17	0.007	270	0.004	96	0.011	208	0.012	355	0.001	95	0.007	216
DCP17	.969	-0.054	0.049	101	0.004	40	0.006	214	0.006	144	0.003	346	0.009	98	0.003	207	0.020	198	0.012	35

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.20	0.344	0.301	5.91	0.0	10.01	12013.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.9 (334.4)	27195. (568.0)	0.48E 07	-0.050	1.390	15.70	-0.00077	0.673	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		10.006	5.909 0	0.572 339	0.082 191	0.018 131	0.033 24	0.031 106	0.025 194	0.011 140	0.005 250
CN		0.928	0.436 22	0.039 99	0.042 328	0.033 195	0.020 56	0.007 277	0.008 142	0.008 321	0.006 211
CM		-0.001	0.032 271	0.025 311	0.0[illegible] 146	0.006 349	0.005 194	0.003 66	0.003 326	0.002 177	0.002 84
DCP 1	.010	4.405	1.809 8	0.883 356	0.454 245	0.259 148	0.095 47	0.060 207	0.125 96	0.092 4	0.057 291
DCP 2	.020	3.542	1.528 20	0.841 5	0.514 255	0.329 150	0.150 91	0.030 18	0.060 7	0.076 275	0.039 173
DCP 3	.030	3.134	1.349 29	0.805 353	0.3 237	0.141 145	0.107 120	0.148 41	0.100 314	0.071 248	0.073 187
DCP 4	.049	3.101	1.384 2	0.146 359	0.024 272	0.018 108	0.015 331	0.015 180	0.008 16	0.009 215	0.010 156
DCP 5	.074	2.632	1.096 5	0.115 3	0.006 340	0.003 12	0.015 27[illegible]	0.027 143	0.009 52	0.011 236	0.009 181
DCP 6	.099	2.336	0.965 9	0.098 1	0.0[illegible] 294	0.013 269	0.002 258	0.015 106	0.007 289	0.013 202	0.006 131
DCP 7	.149	1.745	0.771 12	0.069 323	0.029 124	0.009 [illegible]	0.006 303	0.005 119	0.009 307	0.011 147	0.013 64
DCP 8	.200	1.459	0.714 18	0.079 253	0.030 94	0.033 [illegible]	0.007 123	0.013 249	0.008 190	0.008 284	0.003 258
DCP 9	.250	1.282	0.694 10	0.138 191	0.12[illegible] 43	0.069 258	0.033 106	0.001 302	0.004 57	0.016 367	0.015 160
DCP10	.300	1.160	0.601 7	0.155 171	0.125 26	0.080 253	0.033 125	0.023 332	0.032 161	0.027 351	0.031 206
DCP11	.399	0.935	0.468 26	0.135 161	0.106 17	0.073 242	0.042 100	0.023 317	0.009 191	0.013 352	0.012 192
DCP12	.501	0.655	0.349 36	0.121 126	0.104 337	0.074 197	0.052 59	0.028 289	0.018 146	0.008 271	0.004 152
DCP13	.600	0.491	0.299 51	0.107 111	0.083 314	0.061 167	0.040 41	0.025 243	0.020 131	0.016 339	0.020 245
DCP14	.701	0.408	0.268 61	0.086 116	0.067 299	0.046 157	0.031 7	0.010 228	0.014 147	0.011 323	0.008 114
DCP15	.800	0.218	0.167 65	0.073 105	0.038 282	0.025 141	0.024 350	0.095 214	0.013 143	0.009 344	0.003 305
DCP16	.900	-0.004	0.050 67	0.059 81	0.033 253	0.026 115	0.020 334	0.008 1[illegible]7	0.013 25	0.011 93	0.020 294
DCP17	.969	-0.041	0.021 126	0.025 72	0.010 266	0.014 52	0.011 302	0.008 190	0.016 192	0.016 327	0.009 224

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.21	0.347	0.300	5.91	0.0	12.48	12013.6	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.5 (333.1)	27033. (564.6)	0.48E 07	-0.175	1.698	18.58	0.00042	-0.365	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.476	5.914 0	0.659 335	0.051 128	0.043 152	0.029 67	0.021 125	0.016 168	0.011 144	0.008 53
CN		1.043	0.620 19	0.069 197	0.030 90	0.024 19	0.013 238	0.016 277	0.015 171	0.012 69	0.002 297
CM		-0.031	0.047 152	0.063 323	0.022 186	0.008 111	0.011 346	0.006 153	0.002 298	0.005 197	0.003 81
DCP 1	.010	3.894	1.593 64	1.157 16	0.262 355	0.403 300	0.261 226	0.172 181	0.093 130	0.022 96	0.008 323
DCP 2	.020	3.330	1.648 60	0.968 11	0.127 338	0.295 316	0.270 238	0.205 184	0.140 143	0.107 103	0.084 50
DCP 3	.030	2.925	1.535 66	0.899 9	0.194 343	0.306 289	0.159 210	0.139 206	0.150 146	0.084 91	0.106 70
DCP 4	.049	3.078	1.336 35	0.614 359	*0.275 252*	*0.130 163*	*0.069 122*	0.079 70	0.083 346	0.058 264	0.037 189
DCP 5	.074	2.688	1.277 31	0.482 332	0.239 215	0.123 127	0.061 78	0.066 23	0.050 311	0.042 250	0.03[illegible] 195
DCP 6	.099	2.433	1.258 29	0.407 312	0.193 189	0.086 114	0.057 76	0.060 9	0.041 302	0.054 248	0.046 158
DCP 7	.149	1.886	1.175 24	0.342 282	0.154 178	0.123 124	0.089 36	0.065 325	0.061 254	0.043 185	0.031 120
DCP 8	.200	1.639	1.116 23	0.323 271	0.166 180	0.117 115	0.094 51	0.091 336	0.062 276	0.081 212	0.071 130
DCP 9	.250	1.475	1.125 14	0.347 242	0.202 150	0.142 76	0.121 6	0.117 277	0.085 200	0.092 120	0.073 38
DCP10	.300	1.333	1.005 11	0.338 227	0.178 129	0.130 65	0.136 344	0.119 241	0.083 173	0.105 86	0.059 341
DCP11	.399	1.110	0.810 15	0.316 213	0.195 113	0.138 37	0.155 311	0.126 205	0.082 148	0.092 58	0.069 317
DCP12	.501	0.831	0.623 [illegible]	0.306 180	0.193 69	0.145 346	0.172 244	0.107 126	0.058 69	0.060 337	0.050 227
DCP13	.600	0.662	0.465 [illegible]	0.319 155	0.173 34	0.113 313	0.156 207	0.092 68	0.040 8	0.054 269	0.024 166
DCP14	.701	0.536	0.267 359	0.297 126	0.143 342	0.076 254	0.123 151	0.093 350	0.028 233	0.018 142	0.019 29
DCP15	.800	0.324	0.153 340	0.248 107	0.129 314	0.047 199	0.074 109	0.067 303	0.018 146	0.030 69	0.021 279
DCP16	.900	0.058	0.071 320	0.128 100	0.074 308	0.067 218	0.062 85	0.045 278	0.008 70	0.017 16	0.022 170
DCP17	.969	-0.020	0.016 354	0.049 103	0.031 306	0.012 275	0.027 112	0.020 338	0.021 239	0.016 352	0.001 282

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.13	0.348	0.299	5.88	0.0	15.03	12013.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
101.1 (331.7)	26832. (560.4)	0.48E 07	-0.245	1.969	21.27	0.00163	-1.406	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.034	5.881	0	0.709	339	0.097	117	0.036	176	0.014	115	0.026	140	0.020	169	0.012	151	0.012	95
CN		1.181	0.687	20	0.032	230	0.043	219	0.012	120	0.010	96	0.014	6	0.015	256	0.003	265	0.002	184
CM		-0.073	0.108	136	0.071	330	0.003	218	0.012	194	0.006	81	0.000	221	0.005	31	0.000	340	0.002	242
DCP 1	.010	3.678	2.197	86	0.547	23	0.618	55	0.296	5	0.292	326	0.138	308	0.108	267	0.031	280	0.026	173
DCP 2	.020	3.264	2.066	87	0.643	19	0.373	57	0.194	5	0.220	338	0.142	321	0.168	289	0.106	247	0.087	220
DCP 3	.030	2.871	1.736	88	0.702	35	0.391	42	0.234	340	0.138	328	0.132	297	0.074	274	0.086	257	0.079	234
DCP 4	.049	3.145	1.271	59	0.653	24	0.228	336	0.208	292	0.192	227	0.105	175	0.079	147	0.079	110	0.070	66
DCP 5	.074	2.783	1.302	49	0.504	358	0.174	307	0.204	261	0.182	187	0.088	136	0.099	110	0.079	54	0.092	9
DCP 6	.099	2.544	1.371	45	0.446	339	0.161	296	0.221	247	0.179	170	0.079	113	0.066	90	0.059	45	0.050	358
DCP 7	.149	2.025	1.390	36	0.409	317	0.230	265	0.186	206	0.159	153	0.097	93	0.057	40	0.042	13	0.047	316
DCP 8	.200	1.727	1.305	37	0.420	315	0.248	250	0.228	212	0.188	138	0.107	91	0.090	36	0.088	3	0.064	283
DCP 9	.250	1.542	1.255	28	0.383	299	0.282	232	0.252	173	0.207	90	0.115	29	0.105	339	0.093	279	0.057	240
DCP10	.300	1.413	1.166	22	0.384	283	0.315	205	0.241	138	0.201	60	0.145	348	0.102	299	0.093	227	0.074	192
DCP11	.399	1.278	1.020	18	0.326	260	0.308	191	0.238	110	0.203	35	0.162	324	0.129	260	0.098	187	0.061	142
DCP12	.501	1.064	0.861	0	0.344	207	0.244	142	0.238	55	0.189	324	0.123	268	0.101	192	0.064	96	0.043	67
DCP13	.600	0.893	0.698	343	0.393	167	0.164	93	0.193	9	0.153	272	0.097	177	0.047	121	0.051	11	0.011	280
DCP14	.701	0.738	0.512	325	0.412	138	0.143	22	0.147	317	0.119	209	0.061	101	0.009	336	0.031	305	0.018	129
DCP15	.800	0.477	0.356	311	0.348	121	0.159	338	0.073	265	0.065	165	0.041	41	0.029	213	0.008	21	0.006	15
DCP16	.900	0.178	0.164	296	0.202	101	0.087	299	0.044	268	0.045	144	0.028	16	0.019	171	0.008	98	0.022	341
DCP17	.969	0.048	0.078	277	0.102	96	0.056	294	0.024	242	0.014	299	0.023	152	0.028	358	0.027	208	0.035	19

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.16	0.349	0.299	5.84	0.0	17.51	12013.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
100.9 (330.9)	26770. (559.1)	0.48E 07	-0.303	2.144	23.17	0.00179	-1.548	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.512	5.835	0	0.734	346	0.127	121	0.031	181	0.019	200	0.007	81	0.018	169	0.013	137	0.017	30
CN		1.268	0.696	29	0.090	312	0.029	228	0.021	219	0.024	202	0.029	100	0.015	344	0.003	53	0.014	11
CM		-0.093	0.139	147	0.066	2	0.007	300	0.012	269	0.007	133	0.003	249	0.006	128	0.003	58	0.004	221
DCP 1	.010	3.482	2.429	105	0.451	85	0.436	86	0.411	79	0.232	79	0.158	59	0.099	40	0.043	50	0.015	322
DCP 2	.020	3.232	2.154	99	0.446	59	0.291	87	0.228	86	0.165	92	0.195	75	0.151	50	0.092	36	0.067	40
DCP 3	.030	2.934	1.763	108	0.581	67	0.395	78	0.144	57	0. 62	68	0.118	47	0.082	33	0.052	40	0.057	34
DCP 4	.049	3.253	1.259	82	0.572	40	0.260	56	0.244	353	0.126	305	0.075	324	0.090	283	0.051	267	0.067	251
DCP 5	.074	2.882	1.272	67	0.441	17	0.247	35	0.272	316	0.149	262	0.054	262	0.091	243	0.057	190	0.062	195
DCP 6	.099	2.621	1.328	60	0.416	4	0.231	17	0.295	299	0.182	246	0.079	216	0.106	212	0.059	152	0.034	158
DCP 7	.149	2.089	1.377	51	0.531	352	0.203	305	0.207	268	0.189	238	0.106	182	0.056	168	0.042	114	0.014	126
DCP 8	.200	1.804	1.290	54	0.623	355	0.223	296	0.222	283	0.193	237	0.118	143	0.078	152	0.044	116	0.024	109
DCP 9	.250	1.665	1.274	42	0.626	337	0.294	263	0.282	241	0.221	179	0.162	141	0.105	88	0.085	70	0.072	35
DCP10	.300	1 536	1.176	3	0.600	325	0.332	246	0.290	210	0.223	148	0.153	97	0.107	50	0.065	12	0.072	353
DCP11	.399	1.399	1.047	47	0.489	308	0.355	228	0.287	181	0.213	119	0.166	71	0.148	17	0.077	328	0.076	314
DCP12	.501	1.195	0.995	6	0.390	253	0.292	177	0.246	118	0.178	59	0.112	355	0.110	292	0.041	245	0.010	179
DCP13	.600	0.997	0.859	349	0.408	208	0.214	130	0.197	73	0.151	337	0.052	272	0.052	239	0.033	148	0.017	38
DCP14	.701	0.816	0.649	331	0.407	171	0.169	62	0.123	13	0.109	277	0.031	181	0.011	181	0.015	71	0.009	12
DCP15	.800	0.551	0.451	319	0.360	152	0.161	31	0.085	323	0.072	225	0.032	71	0.029	268	0.005	171	0.008	134
DCP16	.900	0.247	0.188	309	0.227	125	0.0	335	0.033	344	0.051	252	0.014	118	0.024	299	0.027	194	0.028	32
DCP17	.969	0.086	0.095	305	0.128	128	0.0	327	0.027	164	0.054	336	0.049	195	0.030	51	0.051	257	0.047	97

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.11	0.349	0.299	5.83	0.0	19.95	12013.9	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.9 (331.0)	26755. (558.8)	0.48E 07	-0.324	2.278	25.01	0.00106	-0.917	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.954	5.831	0	0.662	352	0.131	149	0.033	176	0.028	176	0.007	60	0.023	166	0.013	159	0.012	109
CN		1.294	0.726	37	0.170	335	0.038	246	0.037	306	0.035	220	0.016	174	0.010	103	0.009	178	0.005	108
CM		-0.114	0.145	165	0.053	47	0.013	351	0.004	309	0.004	296	0.002	25	0.005	253	0.001	142	0.002	303
DCP 1	.010	3.277	2.238	120	0.614	101	0.506	121	0.294	139	0.226	123	0.166	121	0.049	142	0.083	111	0.026	152
DCP 2	.020	3.076	1.921	115	0.533	90	0.318	126	0.162	141	0.184	152	0.188	145	0.127	143	0.128	136	0.069	143
DCP 3	.030	2.760	1.605	111	0.527	107	0.243	121	0.169	100	0.177	154	0.110	142	0.090	141	0.079	161	0.082	186
DCP 4	.049	3.049	1.376	97	0.474	44	0.293	112	0.257	32	0.040	15	0.085	50	0.075	28	0.043	34	0.059	35
DCP 5	.074	2.693	1.327	79	0.381	30	0.236	81	0.266	12	0.104	336	0.091	354	0.099	330	0.045	323	0.069	336
DCP 6	.099	2.492	1.377	67	0.384	23	0.192	58	0.291	0	0.129	311	0.069	338	0.111	323	0.077	279	0.043	264
DCP 7	.149	2.060	1.307	56	0.547	16	0.181	353	0.234	330	0.118	294	0.115	302	0.102	264	0.052	229	0.038	244
DCP 8	.200	1.828	1.245	60	0.662	16	0.239	348	0.243	327	0.168	295	0.117	291	0.105	253	0.043	251	0.050	265
DCP 9	.250	1.695	1.211	47	0.680	356	0.297	307	0.260	285	0.199	243	0.136	213	0.120	177	0.066	166	0.045	142
DCP10	.300	1.571	1.109	41	0.633	348	0.337	290	0.266	260	0.210	211	0.153	169	0.114	133	0.071	125	0.054	86
DCP11	.399	1.483	1.112	35	0.575	336	0.371	273	0.241	240	0.176	200	0.163	153	0.097	119	0.049	115	0.048	62
DCP12	.501	1.279	0.998	16	0.445	295	0.315	226	0.194	170	0.128	128	0.102	76	0.092	37	0.030	346	0.023	342
DCP13	.600	1.060	0.870	4	0.376	257	0.253	182	0.163	118	0.079	67	0.067	8	0.041	358	0.025	240	0.020	166
DCP14	.701	0.850	0.648	352	0.319	217	0.206	131	0.134	49	0.035	351	0.032	275	0.013	340	0.015	159	0.006	122
DCP15	.800	0.625	0.463	343	0.268	185	0.161	100	0.134	10	0.061	262	0.026	151	0.039	332	0.015	228	0.009	84
DCP16	.900	0.310	0.246	339	0.174	155	0.086	36	0.033	335	0.017	346	0.032	231	0.022	127	0.015	303	0.019	142
DCP17	.969	0.154	0.173	328	0.169	151	0.131	18	0.081	238	0.078	74	0.071	285	0.063	157	0.039	9	0.029	244

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.088	0.396	5.16	0.0	0.05	12017.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.3 (440.7)	17558. (366.7)	0.24E 07	-0.039	0.610	5.00	-0.00088	0.950	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.045	5.157	0	0.237	9	0.048	261	0.002	7	0.013	355	0.019	102	0.026	190	0.001	168	0.006	354
CN		0.146	0.462	355	0.013	347	0.001	8	0.001	59	0.002	285	0.001	168	0.001	53	0.003	312	0.002	211
CM		-0.021	0.015	311	0.002	351	0.001	345	0.000	196	0.001	284	0.000	71	0.001	240	0.001	249	0.001	38
DCP 1	.010	-0.639	3.235	348	0.162	22	0.017	85	0.004	49	0.016	272	0.019	135	0.011	266	0.023	270	0.006	3
DCP 2	.020	-0.229	2.302	351	0.094	308	0.017	27	0.044	215	0.070	295	0.035	32	0.005	80	0.032	303	0.017	69
DCP 3	.030	-0.002	1.997	351	0.078	311	0.020	333	0.002	36	0.011	267	0.007	155	0.007	280	0.013	286	0.004	162
DCP 4	.049	0.211	1.643	351	0.058	319	0.009	326	0.004	40	0.015	252	0.003	123	0.005	278	0.014	279	0.004	67
DCP 5	.074	0.333	1.341	351	0.048	334	0.001	51	0.004	104	0.009	265	0.005	104	0.004	304	0.016	257	0.002	316
DCP 6	.099	0.356	1.157	352	0.043	334	0.006	37	0.005	46	0.009	287	0.001	159	0.006	86	0.014	276	0.007	71
DCP 7	.149	0.256	0.863	352	0.032	15	0.020	355	0.009	173	0.002	261	0.008	173	0.002	162	0.013	305	0.001	281
DCP 8	.200	0.218	0.703	355	0.020	352	0.006	12	0.005	84	0.011	302	0.004	76	0.001	343	0.013	279	0.004	276
DCP 9	.250	0.222	0.619	355	0.024	2	0.003	270	0.003	52	0.001	0	0.003	220	0.001	187	0.007	295	0.002	123
DCP10	.300	0.200	0.511	355	0.022	349	0.003	336	0.003	150	0.006	237	0.005	228	0.001	313	0.005	70	0.002	185
DCP11	.399	0.189	0.412	0	0.011	5	0.002	262	0.001	290	0.002	320	0.009	167	0.001	338	0.002	118	0.003	97
DCP12	.501	0.141	0.309	1	0.008	27	0.003	17	0.005	9	0.003	98	0.005	321	0.004	88	0.001	166	0.004	266
DCP13	.600	0.198	0.235	5	0.006	53	0.003	332	0.006	1	0.003	32	0.003	8	0.005	59	0.002	104	0.004	185
DCP14	.701	0.221	0.158	7	0.001	102	0.007	198	0.001	28	0.003	85	0.001	207	0.006	57	0.004	347	0.008	264
DCP15	.800	0.118	0.078	22	0.009	213	0.008	118	0.001	121	0.001	113	0.001	135	0.004	229	0.004	9	0.006	215
DCP16	.900	-0.075	0.022	62	0.010	207	0.004	206	0.002	0	0.005	256	0.002	249	0.004	8	0.006	59	0.007	182
DCP17	.969	-0.042	0.031	169	0.001	294	0.005	137	0.006	169	0.004	149	0.002	122	0.003	146	0.007	86	0.004	35

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.088	0.395	5.17	0.0	2.47	12017.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.4 (437.8)	17376. (362.9)	0.24E 07	-0.036	0.845	7.57	-0.00083	0.888	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.472	5.168 0	0.238 9	0.043 262	0.004 216	0.022 337	0.017 134	0.024 190	0.001 246	0.006 337
CN		0.383	0.468 355	0.017 1	0.004 334	0.003 192	0.004 267	0.004 238	0.003 32	0.005 331	0.003 71
CM		-0.015	0.014 310	0.001 341	0.001 136	0.001 13	0.000 98	0.001 78	0.001 215	0.003 178	0.001 266
DCP 1	.010	0.996	3.077 348	0.118 7	0.004 23	0.013 84	0.021 284	0.014 171	0.007 131	0.015 171	0.006 34
DCP 2	.020	0.948	2.497 351	0.097 329	0.048 154	0.033 96	0.051 302	0.008 296	0.011 118	0.025 184	0.009 83
DCP 3	.030	1.006	2.034 351	0.071 5	0.059 329	0.015 258	0.018 154	0.012 104	0.004 250	0.013 181	0.002 350
DCP 4	.049	1.064	1.700 351	0.059 331	0.009 314	0.006 90	0.009 277	0.004 125	0.004 202	0.015 195	0.004 15
DCP 5	.074	1.034	1.363 351	0.047 346	0.006 301	0.004 174	0.010 299	0.005 194	0.001 22	0.013 192	0.006 70
DCP 6	.099	0.952	1.153 352	0.050 359	0.017 329	0.003 163	0.015 298	0.010 197	0.004 52	0.017 196	0.009 65
DCP 7	.149	0.705	0.771 352	0.035 1	0.002 353	0.008 47	0.005 200	0.005 31	0.001 338	0.005 212	0.003 191
DCP 8	.200	0.583	0.534 356	0.029 354	0.003 271	0.004 157	0.006 324	0.009 142	0.002 173	0.017 195	0.008 353
DCP 9	.250	0.532	0.614 354	0.027 16	0.006 11	0.006 269	0.004 240	0.002 221	0.006 322	0.006 274	0.004 39
DCP10	.300	0.467	0.508 354	0.023 17	0.003 53	0.004 273	0.003 246	0.003 186	0.007 9	0.006 14	0.006 90
DCP11	.399	0.397	0.417 0	0.018 15	0.004 30	0.004 252	0.007 160	0.008 267	0.003 30	0.012 11	0.001 146
DCP12	.501	0.301	0.316 2	0.012 12	0.007 0	0.003 120	0.003 246	0.005 219	0.003 70	0.010 336	0.003 116
DCP13	.600	0.313	0.227 7	0.005 68	0.002 320	0.019 213	0.014 241	0.016 266	0.005 351	0.020 336	0.008 29
DCP14	.701	0.296	0.155 5	0.001 329	0.005 311	0.004 211	0.002 346	0.005 250	0.008 65	0.009 354	0.005 97
DCP15	.800	0.151	0.091 15	0.003 67	0.003 298	0.003 125	0.008 344	0.005 312	0.001 76	0.006 2	0.004 136
DCP16	.900	-0.069	0.024 38	0.006 290	0.004 300	0.008 143	0.003 316	0.004 202	0.004 334	0.012 334	0.006 69
DCP17	.969	-0.053	0.018 182	0.005 211	0.003 292	0.002 226	0.003 160	0.005 200	0.004 73	0.005 20	0.005 88

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.088	0.395	5.16	0.0	5.01	12017.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.4 (437.6)	17414. (363.7)	0.24E 07	-0.027	1.054	10.16	-0.00101	1.082	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		5.013	5.161 0	0.233 9	0.039 258	0.007 331	0.021 341	0.018 141	0.021 190	0.008 182	0.006 304
CN		0.612	0.445 357	0.038 15	0.009 284	0.004 117	0.001 308	0.004 215	0.002 281	0.005 281	0.001 351
CM		-0.007	0.018 314	0.004 239	0.001 105	0.001 291	0.000 261	0.001 44	0.001 98	0.001 95	0.001 182
DCP 1	.010	2.681	3.142 349	0.199 319	0.049 199	0.026 218	0.038 148	0.032 76	0.010 6	0.017 348	0.010 282
DCP 2	.020	2.410	2.806 353	0.342 294	0.174 191	0.061 91	0.047 325	0.039 184	0.026 26	0.042 257	0.046 136
DCP 3	.030	2.001	1.920 351	0.160 19	0.013 247	0.048 76	0.054 335	0.029 260	0.016 178	0.019 37	0.019 305
DCP 4	.049	1.895	1.628 351	0.113 19	0.051 329	0.024 261	0.012 215	0.009 153	0.002 21	0.009 307	0.005 175
DCP 5	.074	1.706	1.305 35	0.098 16	0.031 322	0.007 287	0.007 251	0.004 139	0.003 277	0.008 285	0.003 142
DCP 6	.099	1.526	1.110	0.085 18	0.027 318	0.002 116	0.004 274	0.002 176	0.003 241	0.007 312	0.003 115
DCP 7	.149	1.142	0.827 35	0.059 14	0.010 333	0.002 297	0.008 283	0.009 222	0.007 243	0.004 220	0.006 255
DCP 8	.200	0.933	0.680 356	0.049 18	0.016 295	0.010 225	0.003 322	0.004 320	0.004 339	0.005 9	0.002 307
DCP 9	.250	0.827	0.583 356	0.044 17	0.007 316	0.004 139	0.002 248	0.004 194	0.004 185	0.007 190	0.001 327
DCP10	.300	0.716	0.478 357	0.042 18	0.009 250	0.006 73	0.004 208	0.004 205	0.004 352	0.005 268	0.001 316
DCP11	.399	0.598	0.380 2	0.040 29	0.012 278	0.007 157	0.003 117	0.008 239	0.003 110	0.008 263	0.003 250
DCP12	.501	0.446	0.291 4	0.035 19	0.011 292	0.005 102	0.002 175	0.002 151	0.006 267	0.002 331	0.006 95
DCP13	.600	0.411	0.209 8	0.031 26	0.010 337	0.008 102	0.005 22	0.002 79	0.002 263	0.005 274	0.006 333
DCP14	.701	0.354	0.128 18	0.031 45	0.010 294	0.002 36	0.004 98	0.005 242	0.006 311	0.005 285	0.005 49
DCP15	.800	0.179	0.074 27	0.026 55	0.005 246	0.002 123	0.001 40	0.009 224	0.001 192	0.010 264	0.006 7
DCP16	.900	-0.054	0.035 33	0.007 319	0.006 252	0.008 107	0.006 312	0.004 258	0.004 294	0.007 302	0.002 255
DCP17	.969	-0.064	0.010 191	0.007 297	0.006 236	0.004 154	0.003 172	0.006 149	0.002 216	0.006 273	0.003 232

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.10	0.088	0.394	5.14	0.0	7.48	12017.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.9 (436.1)	17333. (362.0)	0.24E 07	-0.079	1.257	12.31	-0.00065	0.694	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.484	5.140	0	0.246	14	0.042	277	0.014	264	0.008	20	0.012	46	0.023	208	0.006	67	0.004	8
CN		0.760	0.330	16	0.146	11	0.066	250	0.035	132	0.018	22	0.006	285	0.001	333	0.007	352	0.004	136
CM		-0.012	0.014	229	0.019	78	0.019	333	0.012	235	0.006	153	0.002	103	0.002	59	0.004	258	0.002	271
DCP 1	.010	3.341	1.609	358	0.925	51	0.463	339	0.177	276	0.094	292	0.132	250	0.104	180	0.044	182	0.029	98
DCP 2	.020	2.891	1.452	9	0.940	43	0.512	329	0.162	283	0.157	293	0.151	238	0.127	190	0.061	139	0.041	79
DCP 3	.030	2.612	1.211	5	0.640	37	0.317	313	0.204	246	0.139	193	0.108	199	0.107	117	0.061	61	0.068	29
DCP 4	.049	2.244	0.760	10	0.716	48	0.386	318	0.184	223	0.064	144	0.031	164	0.071	116	0.069	19	0.055	323
DCP 5	.074	1.997	0.643	14	0.582	40	0.309	304	0.163	204	0.061	115	0.015	162	0.060	91	0.071	348	0.051	282
DCP 6	.099	1.792	0.602	16	0.490	33	0.273	292	0.155	192	0.057	104	0.017	141	0.058	74	0.073	332	0.050	262
DCP 7	.149	1.410	0.581	15	0.334	13	0.225	268	0.123	165	0.057	81	0.028	59	0.054	34	0.058	296	0.036	227
DCP 8	.200	1.189	0.569	15	0.256	2	0.170	252	0.121	154	0.057	66	0.029	35	0.036	351	0.060	285	0.025	207
DCP 9	.250	1.069	0.524	13	0.213	346	0.155	229	0.102	125	0.047	45	0.025	0	0.041	321	0.026	243	0.032	149
DCP10	.300	0.924	0.445	14	0.180	340	0.135	217	0.092	115	0.054	28	0.024	341	0.031	291	0.026	218	0.027	122
DCP11	.399	0.764	0.355	18	0.126	342	0.095	206	0.066	102	0.032	12	0.018	322	0.021	292	0.010	207	0.021	118
DCP12	.501	0.563	0.267	23	0.099	344	0.068	203	0.055	94	0.033	4	0.014	300	0.015	263	0.011	121	0.019	102
DCP13	.600	0.478	0.194	30	0.073	345	0.047	188	0.039	75	0.025	349	0.009	288	0.008	255	0.012	82	0.014	84
DCP14	.701	0.403	0.118	37	0.052	345	0.052	168	0.045	53	0.024	312	0.009	251	0.014	240	0.021	89	0.008	23
DCP15	.800	0.227	0.096	28	0.042	285	0.055	153	0.039	42	0.029	310	0.011	238	0.008	182	0.019	53	0.005	322
DCP16	.900	-0.013	0.086	10	0.053	259	0.043	138	0.023	42	0.012	325	0.010	232	0.019	137	0.023	36	0.003	213
DCP17	.969	-0.055	0.031	4	0.023	246	0.012	146	0.008	16	0.004	21	0.008	261	0.006	158	0.015	36	0.001	314

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.089	0.393	5.11	0.0	10.00	12017.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.6 (434.8)	17242. (360.1)	0.24E 07	-0.145	1.396	13.93	-0.00086	0.919	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.004	5.113	0	0.235	15	0.021	274	0.024	19	0.089	332	0.071	193	0.041	198	0.012	39	0.014	339
CN		0.871	0.250	48	0.164	24	0.024	333	0.038	311	0.030	230	0.021	161	0.012	103	0.010	67	0.008	4
CM		-0.026	0.044	200	0.031	100	0.009	60	0.015	49	0.013	343	0.009	303	0.007	262	0.008	213	0.005	158
DCP 1	.010	3.760	0.297	56	1.044	70	0.217	89	0.372	65	0.151	22	0.134	51	0.094	3	0.028	40	0.044	349
DCP 2	.020	3.223	0.560	71	1.013	65	0.284	92	0.376	59	0.198	41	0.127	30	0.122	16	0.030	348	0.077	359
DCP 3	.030	2.937	0.414	49	0.657	64	0.221	55	0.236	31	0.207	349	0.134	335	0.120	318	0.086	294	0.074	281
DCP 4	.049	2.434	0.351	119	0.787	67	0.140	40	0.186	40	0.143	336	0.042	312	0.078	323	0.070	260	0.048	260
DCP 5	.074	2.144	0.354	110	0.628	60	0.106	33	0.162	26	0.119	316	0.034	291	0.051	298	0.060	237	0.036	227
DCP 6	.099	1.923	0.352	96	0.516	53	0.088	20	0.155	15	0.108	303	0.042	278	0.054	276	0.061	215	0.031	202
DCP 7	.149	1.531	0.378	68	0.405	37	0.089	0	0.131	339	0.110	276	0.057	241	0.051	223	0.053	187	0.035	164
DCP 8	.200	1.313	0.388	56	0.329	31	0.087	348	0.126	326	0.099	263	0.068	231	0.058	195	0.053	167	0.035	143
DCP 9	.250	1.209	0.421	46	0.290	16	0.098	318	0.111	295	0.091	244	0.073	200	0.054	161	0.049	126	0.035	107
DCP10	.300	1.057	0.382	43	0.242	5	0.075	306	0.096	278	0.075	214	0.056	171	0.045	130	0.036	87	0.026	70
DCP11	.399	0.900	0.346	39	0.175	357	0.044	298	0.072	279	0.061	210	0.048	168	0.038	128	0.023	81	0.024	83
DCP12	.501	0.687	0.301	38	0.131	343	0.034	278	0.056	263	0.059	195	0.042	151	0.033	112	0.025	65	0.026	43
DCP13	.600	0.580	0.248	38	0.109	325	0.023	234	0.041	260	0.049	189	0.038	140	0.033	89	0.034	50	0.033	4
DCP14	.701	0.481	0.183	40	0.087	306	0.023	206	0.038	239	0.038	160	0.036	117	0.031	69	0.032	28	0.035	339
DCP15	.800	0.287	0.158	30	0.080	294	0.034	230	0.049	215	0.044	142	0.034	91	0.023	52	0.031	7	0.026	303
DCP16	.900	0.041	0.148	8	0.064	281	0.015	255	0.029	211	0.033	139	0.027	96	0.024	38	0.023	9	0.024	288
DCP17	.969	-0.024	0.071	7	0.027	267	0.013	272	0.019	223	0.010	174	0.012	113	0.011	43	0.023	24	0.015	303

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.089	0.393	5.10	0.0	12.47	12017.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.7 (435.3)	17270. (360.7)	0.24E 07	-0.156	1.420	14.45	-0.00143	1.520	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.475	5.096	0	0.239	14	0.042	207	0.016	52	0.039	91	0.081	7	0.012	252	0.030	204	0.007	182
CN		0.923	0.270	84	0.091	44	0.071	64	0.018	356	0.027	25	0.022	313	0.010	315	0.018	249	0.007	354
CM		-0.039	0.066	198	0.016	130	0.023	158	0.009	117	0.013	129	0.009	93	0.007	85	0.009	54	0.002	74
DCP 1	.010	4.073	0.932	149	0.302	84	0.515	161	0.161	197	0.205	168	0.107	222	0.103	186	0.045	246	0.050	207
DCP 2	.020	3.541	1.036	131	0.247	105	0.485	157	0.214	175	0.272	177	0.155	209	0.126	198	0.093	251	0.057	263
DCP 3	.030	3.123	0.956	124	0.393	93	0.316	129	0.188	136	0.214	136	0.137	134	0.123	151	0.091	158	0.071	164
DCP 4	.049	2.417	1.009	150	0.319	81	0.363	138	0.110	96	0.148	130	0.064	91	0.074	136	0.047	133	0.060	141
DCP 5	.074	2.128	0.847	143	0.267	78	0.305	125	0.082	82	0.134	112	0.051	58	0.058	113	0.026	103	0.055	114
DCP 6	.099	1.913	0.717	134	0.231	72	0.278	115	0.073	75	0.137	99	0.053	60	0.062	88	0.033	84	0.051	95
DCP 7	.149	1.551	0.544	115	0.214	65	0.224	90	0.079	54	0.117	65	0.061	34	0.065	42	0.042	42	0.044	41
DCP 8	.200	1.342	0.453	101	0.213	64	0.176	75	0.086	47	0.101	46	0.069	20	0.052	15	0.036	29	0.040	18
DCP 9	.250	1.248	0.432	87	0.213	51	0.165	52	0.080	12	0.096	20	0.063	351	0.057	344	0.023	322	0.041	352
DCP10	.300	1.112	0.398	77	0.188	41	0.150	36	0.078	352	0.080	357	0.060	332	0.051	328	0.032	307	0.034	316
DCP11	.399	0.960	0.350	64	0.138	30	0.106	22	0.065	328	0.064	354	0.035	333	0.036	335	0.037	319	0.042	328
DCP12	.501	0.740	0.327	55	0.067	341	0.094	29	0.048	277	0.057	22	0.058	283	0.033	351	0.050	291	0.032	13
DCP13	.600	0.645	0.277	45	0.049	335	0.066	7	0.017	288	0.050	338	0.040	291	0.033	286	0.044	255	0.013	265
DCP14	.701	0.538	0.239	39	0.057	309	0.063	351	0.024	291	0.050	312	0.035	276	0.038	253	0.046	218	0.020	213
DCP15	.800	0.348	0.219	29	0.052	322	0.069	336	0.035	293	0.046	281	0.034	254	0.033	218	0.036	216	0.014	187
DCP16	.900	0.101	0.197	13	0.038	328	0.053	329	0.024	299	0.038	272	0.029	242	0.023	218	0.033	207	0.015	178
DCP17	.969	0.003	0.096	7	0.019	355	0.021	309	0.010	345	0.015	288	0.010	255	0.014	237	0.017	227	0.001	170

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.14	0.089	0.394	5.09	0.0	15.02	12017.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.9 (436.0)	17328. (361.9)	0.24E 07	-0.145	1.388	14.14	-0.00212	2.259	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.022	5.094	0	0.224	5	0.040	232	0.013	269	0.034	293	0.071	150	0.051	189	0.002	237	0.007	320
CN		0.953	0.278	96	0.052	156	0.032	98	0.044	138	0.012	185	0.023	141	0.015	145	0.005	336	0.010	160
CM		-0.052	0.071	201	0.026	236	0.012	194	0.016	249	0.007	280	0.007	279	0.006	286	0.002	330	0.004	310
DCP 1	.010	3.979	1.363	160	0.656	251	0.037	313	0.152	261	0.136	347	0.093	93	0.023	69	0.069	81	0.046	191
DCP 2	.020	3.576	1.367	152	0.781	242	0.154	310	0.169	275	0.155	351	0.088	70	0.049	115	0.046	83	0.054	197
DCP 3	.030	3.066	0.919	149	0.365	206	0.244	216	0.224	258	0.167	311	0.073	354	0.077	33	0.053	53	0.031	112
DCP 4	.049	2.305	1.085	156	0.389	234	0.153	189	0.225	237	0.120	301	0.055	286	0.066	353	0.072	38	0.026	79
DCP 5	.074	2.059	0.883	149	0.335	226	0.123	177	0.188	220	0.100	282	0.059	252	0.050	312	0.070	11	0.025	14
DCP 6	.099	1.890	0.728	141	0.282	216	0.115	169	0.170	208	0.096	268	0.055	233	0.057	301	0.067	3	0.029	16
DCP 7	.149	1.560	0.578	124	0.203	187	0.118	146	0.149	182	0.082	224	0.062	202	0.043	248	0.036	310	0.020	307
DCP 8	.200	1.365	0.506	115	0.174	163	0.132	138	0.134	165	0.087	203	0.063	200	0.058	213	0.044	317	0.023	263
DCP 9	.250	1.282	0.459	102	0.153	135	0.134	115	0.126	139	0.073	165	0.069	166	0.055	184	0.041	234	0.028	238
DCP10	.300	1.145	0.406	93	0.137	122	0.113	100	0.112	119	0.064	146	0.060	142	0.052	165	0.034	212	0.029	194
DCP11	.399	1.009	0.358	78	0.100	102	0.077	78	0.086	107	0.035	134	0.037	124	0.034	157	0.018	240	0.018	192
DCP12	.501	0.807	0.320	63	0.073	89	0.053	55	0.067	98	0.020	138	0.030	121	0.034	146	0.011	196	0.025	176
DCP13	.600	0.681	0.289	50	0.067	84	0.053	14	0.053	86	0.007	145	0.033	117	0.032	132	0.012	170	0.026	137
DCP14	.701	0.573	0.250	39	0.056	65	0.050	351	0.054	70	0.019	112	0.028	84	0.033	89	0.009	76	0.012	123
DCP15	.800	0.402	0.252	29	0.077	46	0.045	348	0.058	67	0.027	53	0.025	68	0.028	73	0.012	56	0.017	82
DCP16	.900	0.156	0.194	18	0.071	42	0.024	17	0.031	60	0.025	79	0.017	88	0.014	63	0.008	36	0.016	109
DCP17	.969	0.028	0.086	20	0.037	45	0.014	13	0.005	359	0.009	108	0.013	131	0.008	42	0.008	76	0.008	135

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.088	0.394	5.12	0.0	17.51	12017.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.0 (436.4)	17371. (362.8)	0.24E 07	-0.136	1.278	14.01	-0.00291	3.104	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.507	5.116	0	0.223	4	0.044	262	0.010	359	0.021	9	0.036	75	0.018	211	0.011	63	0.004	323
CN		0.930	0.248	87	0.074	177	0.042	235	0.020	287	0.012	292	0.010	286	0.011	354	0.015	73	0.006	223
CM		-0.074	0.054	221	0.024	247	0.013	320	0.007	30	0.006	60	0.006	77	0.004	148	0.006	235	0.001	32
DCP 1	.010	3.284	0.755	145	0.382	241	0.240	317	0.176	49	0.095	136	0.050	238	0.042	337	0.028	340	0.033	82
DCP 2	.020	2.896	0.726	136	0.433	229	0.300	317	0.203	53	0.106	122	0.052	201	0.054	328	0.024	37	0.016	85
DCP 3	.030	2.677	0.713	146	0.345	224	0.202	292	0.118	6	0.092	75	0.056	149	0.039	226	0.032	278	0.022	7
DCP 4	.049	1.986	0.534	145	0.380	238	0.197	312	0.101	14	0.045	65	0.029	127	0.023	194	0.021	213	0.016	295
DCP 5	.074	1.825	0.430	131	0.319	228	0.167	295	0.082	359	0.033	52	0.018	98	0.017	168	0.023	209	0.005	213
DCP 6	.099	1.728	0.374	115	0.278	216	0.154	285	0.083	354	0.032	50	0.013	74	0.011	152	0.019	183	0.017	268
DCP 7	.149	1.449	0.359	110	0.251	200	0.144	260	0.066	327	0.033	0	0.023	42	0.013	81	0.026	183	0.024	251
DCP 8	.200	1.286	0.338	108	0.216	199	0.127	251	0.064	303	0.047	346	0.032	48	0.014	75	0.026	161	0.013	234
DCP 9	.250	1.248	0.348	100	0.195	187	0.121	232	0.066	274	0.054	317	0.040	14	0.024	31	0.022	88	0.009	218
DCP10	.300	1.128	0.320	91	0.158	171	0.095	216	0.063	255	0.045	298	0.031	339	0.027	21	0.025	76	0.015	171
DCP11	.399	1.017	0.320	82	0.116	148	0.071	192	0.043	246	0.035	296	0.021	333	0.021	23	0.029	58	0.010	179
DCP12	.501	0.844	0.294	67	0.083	118	0.046	171	0.030	223	0.025	269	0.027	286	0.025	16	0.029	72	0.009	207
DCP13	.600	0.727	0.271	59	0.079	88	0.038	163	0.033	238	0.017	258	0.030	252	0.027	333	0.024	65	0.006	251
DCP14	.701	0.624	0.256	51	0.080	72	0.040	147	0.017	237	0.031	233	0.032	250	0.018	306	0.016	39	0.006	245
DCP15	.800	0.473	0.223	46	0.079	58	0.034	130	0.012	183	0.020	210	0.021	241	0.012	266	0.020	41	0.001	259
DCP16	.900	0.221	0.150	47	0.050	53	0.022	134	0.014	174	0.012	200	0.018	226	0.010	314	0.020	63	0.004	233
DCP17	.969	0.053	0.073	46	0.030	43	0.012	153	0.002	167	0.009	208	0.008	267	0.009	328	0.018	56	0.002	116

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.089	0.394	5.12	0.0	19.93	12017.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.0 (436.2)	17352. (362.4)	0.24E 07	-0.132	1.166	21.38	-0.00286	3.055	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.934	5.125	0	0.231	6	0.045	254	0.010	341	0.016	355	0.026	120	0.035	231	0.014	345	0.009	325
CN		0.956	0.196	62	0.013	144	0.008	141	0.004	242	0.008	342	0.006	152	0.006	304	0.018	3	0.003	80
CM		-0.089	0.039	250	0.002	358	0.004	315	0.002	1	0.001	130	0.001	346	0.001	120	0.005	197	0.001	332
DCP 1	.010	1.703	0.075	86	0.016	165	0.011	76	0.003	43	0.004	118	0.002	222	0.005	233	0.011	309	0.006	137
DCP 2	.020	1.675	0.140	46	0.004	188	0.007	92	0.001	208	0.003	356	0.003	333	0.005	267	0.010	306	0.005	101
DCP 3	.030	1.637	0.169	41	0.001	331	0.006	49	0.005	221	0.001	125	0.003	279	0.007	329	0.005	297	0.009	58
DCP 4	.049	2.437	0.328	111	0.049	171	0.038	322	0.035	4	0.027	45	0.012	146	0.010	282	0.011	281	0.002	245
DCP 5	.074	2.381	0.337	90	0.041	110	0.026	307	0.031	316	0.030	330	0.005	124	0.004	186	0.010	295	0.003	181
DCP 6	.099	2.378	0.386	59	0.119	79	0.041	136	0.027	274	0.028	283	0.005	46	0.003	290	0.018	345	0.008	58
DCP 7	.149	1.588	0.241	28	0.041	114	0.027	241	0.022	228	0.038	18	0.015	30	0.027	310	0.012	271	0.018	30
DCP 8	.200	1.188	0.219	41	0.012	288	0.009	93	0.009	4	0.016	45	0.009	131	0.016	281	0.014	352	0.011	84
DCP 9	.250	1.148	0.229	45	0.016	216	0.007	327	0.012	34	0.005	58	0.011	203	0.008	295	0.026	346	0.008	88
DCP10	.300	1.058	0.214	46	0.014	203	0.003	349	0.007	307	0.006	342	0.007	191	0.006	341	0.024	345	0.005	25
DCP11	.399	0.998	0.217	56	0.017	200	0.006	126	0.003	309	0.012	326	0.001	196	0.007	6	0.028	21	0.004	268
DCP12	.501	0.872	0.220	60	0.017	190	0.011	128	0.012	182	0.010	302	0.004	156	0.004	317	0.023	13	0.007	38
DCP13	.600	0.785	0.222	68	0.018	166	0.013	144	0.011	193	0.012	307	0.003	282	0.010	288	0.022	9	0.006	56
DCP14	.701	0.720	0.209	73	0.023	153	0.020	138	0.007	208	0.005	269	0.003	154	0.007	283	0.023	7	0.008	180
DCP15	.800	0.581	0.187	77	0.011	155	0.023	147	0.008	188	0.004	15	0.009	140	0.004	278	0.014	9	0.008	186
DCP16	.900	0.254	0.134	73	0.008	45	0.006	130	0.001	313	0.007	11	0.004	161	0.002	323	0.018	27	0.008	90
DCP17	.969	0.046	0.064	66	0.004	43	0.015	112	0.004	161	0.004	144	0.004	194	0.001	318	0.021	14	0.003	265

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.087	0.401	5.15	0.0	0.03	12015.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
135.5 (444.6)	35364. (738.6)	0.47E 07	-0.030	0.600	5.10	-0.00077	0.833	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.027	5.152	0	0.241	7	0.044	261	0.007	179	0.009	1	0.027	115	0.025	194	0.006	70	0.006	10
CN		0.127	0.474	354	0.018	356	0.003	0	0.001	295	0.001	278	0.002	199	0.001	77	0.002	13	0.001	243
CM		-0.016	0.013	308	0.001	319	0.001	179	0.000	58	0.000	304	0.001	106	0.001	285	0.001	257	0.000	79
DCP 1	.010	-0.739	3.394	348	0.251	34	0.046	123	0.004	76	0.008	120	0.026	154	0.008	265	0.012	301	0.007	222
DCP 2	.020	-0.305	2.402	351	0.094	327	0.029	323	0.011	15	0.004	108	0.023	171	0.008	298	0.007	303	0.007	264
DCP 3	.030	-0.030	2.030	351	0.077	322	0.014	327	0.000	85	0.002	241	0.012	167	0.005	300	0.005	296	0.006	264
DCP 4	.049	0.171	1.663	351	0.064	324	0.011	350	0.002	322	0.003	285	0.008	175	0.003	339	0.007	289	0.003	193
DCP 5	.074	0.321	1.346	351	0.053	335	0.007	3	0.005	328	0.004	273	0.009	165	0.003	80	0.008	316	0.003	75
DCP 6	.099	0.375	1.166	351	0.042	339	0.010	346	0.001	72	0.006	302	0.007	171	0.003	331	0.007	299	0.004	92
DCP 7	.149	0.246	0.861	352	0.034	351	0.002	353	0.006	43	0.011	313	0.007	135	0.003	305	0.004	295	0.002	45
DCP 8	.200	0.212	0.705	355	0.027	351	0.003	320	0.001	133	0.001	261	0.004	156	0.004	14	0.007	330	0.002	234
DCP 9	.250	0.188	0.622	354	0.027	3	0.004	4	0.004	266	0.006	263	0.006	239	0.002	294	0.000	322	0.003	224
DCP10	.300	0.193	0.521	356	0.023	1	0.003	325	0.001	258	0.003	296	0.003	213	0.001	348	0.002	14	0.002	339
DCP11	.399	0.184	0.414	359	0.020	357	0.003	19	0.001	290	0.003	294	0.001	337	0.003	78	0.004	47	0.003	29
DCP12	.501	0.123	0.319	0	0.013	5	0.005	18	0.002	83	0.001	233	0.000	79	0.001	175	0.002	21	0.004	182
DCP13	.600	0.148	0.243	3	0.010	10	0.003	54	0.000	153	0.002	199	0.003	209	0.007	137	0.003	32	0.002	185
DCP14	.701	0.193	0.167	6	0.006	35	0.004	315	0.002	300	0.004	114	0.004	284	0.005	44	0.004	87	0.005	260
DCP15	.800	0.094	0.097	9	0.005	57	0.002	31	0.001	325	0.001	135	0.001	257	0.003	144	0.004	107	0.005	210
DCP16	.900	-0.086	0.024	19	0.005	196	0.005	0	0.007	240	0.003	136	0.004	265	0.002	7	0.003	16	0.005	15
DCP17	.969	-0.041	0.024	163	0.006	166	0.002	284	0.003	153	0.000	96	0.001	165	0.004	117	0.002	101	0.005	245

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.087	0.399	5.15	0.0	2.50	12015.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
134.6 (441.5)	35000. (731.0)	0.47E 07	-0.026	0.845	7.60	-0.00076	0.825	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.503	5.154	0	0.245	9	0.034	262	0.003	278	0.020	349	0.016	133	0.023	182	0.013	102	0.006	291
CN		0.374	0.472	354	0.020	8	0.006	328	0.002	93	0.003	314	0.002	189	0.002	57	0.004	86	0.003	281
CM		-0.011	0.013	312	0.002	261	0.001	147	0.000	275	0.000	146	0.000	100	0.001	261	0.002	273	0.001	87
DCP 1	.010	1.041	3.157	348	0.123	358	0.029	134	0.012	93	0.023	288	0.014	156	0.006	321	0.004	262	0.003	31
DCP 2	.020	0.928	2.414	351	0.089	358	0.050	336	0.003	336	0.011	293	0.016	177	0.005	80	0.009	31	0.009	272
DCP 3	.030	1.024	2.075	350	0.072	344	0.032	329	0.003	115	0.015	310	0.009	194	0.006	57	0.002	346	0.002	93
DCP 4	.049	1.957	1.728	351	0.059	327	0.017	315	0.001	205	0.009	294	0.007	153	0.005	330	0.009	332	0.004	26
DCP 5	.074	1.035	1.374	351	0.047	339	0.015	338	0.002	140	0.009	294	0.007	166	0.005	292	0.006	312	0.001	277
DCP 6	.099	0.978	1.172	351	0.044	357	0.014	324	0.003	53	0.005	348	0.006	161	0.004	303	0.005	255	0.002	206
DCP 7	.149	0.705	0.870	352	0.032	355	0.004	326	0.002	218	0.004	96	0.008	146	0.002	293	0.005	270	0.003	121
DCP 8	.200	0.584	0.714	355	0.026	356	0.009	330	0.003	188	0.006	321	0.005	183	0.004	307	0.007	338	0.002	344
DCP 9	.250	0.505	0.613	354	0.030	9	0.004	329	0.003	93	0.001	246	0.002	86	0.003	11	0.007	84	0.004	319
DCP10	.300	0.467	0.515	354	0.026	11	0.006	310	0.002	68	0.003	269	0.003	215	0.002	56	0.006	69	0.004	305
DCP11	.399	0.400	0.412	359	0.021	23	0.003	346	0.002	62	0.003	345	0.003	277	0.002	84	0.008	105	0.003	315
DCP12	.501	0.287	0.315	1	0.017	12	0.003	323	0.001	332	0.004	317	0.002	279	0.003	69	0.004	96	0.003	286
DCP13	.600	0.269	0.236	3	0.012	31	0.005	334	0.005	83	0.005	315	0.003	240	0.003	117	0.006	133	0.006	267
DCP14	.701	0.277	0.162	5	0.013	48	0.005	317	0.002	114	0.003	329	0.002	213	0.003	102	0.007	106	0.005	250
DCP15	.800	0.138	0.089	10	0.008	70	0.005	323	0.003	30	0.002	8	0.002	86	0.005	87	0.009	99	0.002	229
DCP16	.900	-0.074	0.024	22	0.006	55	0.008	339	0.006	173	0.003	188	0.003	270	0.007	31	0.008	51	0.006	277
DCP17	.969	-0.050	0.029	170	0.002	275	0.001	187	0.002	30	0.004	330	0.005	111	0.003	130	0.005	77	0.001	345

REPRODUCIBILITY OF THE
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FORCED PITCHING OSCILLATION .RFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.16	0.088	0.398	5.16	0.0	5.03	12015.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.3 (440.5)	34909. (729.1)	0.47E 07	-0.023	1.096	10.20	-0.00089	0.965	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.029	5.159	0	0.236	8	0.038	291	0.007	300	0.019	351	0.005	116	0.019	184	0.011	87	0.002	226
CN		0.610	0.449	356	0.035	17	0.008	276	0.002	156	0.003	21	0.003	284	0.002	69	0.007	49	0.002	202
CM		-0.003	0.017	317	0.004	262	0.001	77	0.000	332	0.001	239	0.001	126	0.001	243	0.002	242	0.001	42
DCP 1	.010	2.851	3.344	349	0.232	298	0.036	195	0.057	228	0.061	148	0.033	65	0.014	344	0.020	13	0.010	311
DCP 2	.020	2.215	2.445	352	0.160	323	0.129	179	0.143	79	0.115	345	0.068	259	0.023	175	0.005	1	0.024	153
DCP 3	.030	2.058	1.980	351	0.131	22	0.039	330	0.009	254	0.003	305	0.007	251	0.008	149	0.017	38	0.007	349
DCP 4	.049	1.928	1.669	351	0.105	15	0.045	328	0.020	248	0.008	222	0.005	200	0.002	268	0.004	54	0.003	100
DCP 5	.074	1.732	1.329	351	0.087	13	0.023	323	0.008	227	0.004	270	0.003	206	0.005	291	0.003	27	0.003	113
DCP 6	.099	1.570	1.118	352	0.076	14	0.017	314	0.005	210	0.001	153	0.003	199	0.003	100	0.004	61	0.005	104
DCP 7	.149	1.146	0.841	353	0.049	12	0.015	309	0.007	202	0.010	316	0.005	268	0.004	250	0.007	354	0.004	71
DCP 8	.200	0.940	0.686	356	0.049	18	0.008	291	0.003	67	0.003	7	0.002	266	0.005	256	0.003	355	0.003	205
DCP 9	.250	0.809	0.584	355	0.043	6	0.006	269	0.004	158	0.002	5	0.000	252	0.005	75	0.007	49	0.004	152
DCP10	.300	0.723	0.484	354	0.039	21	0.009	280	0.001	56	0.002	4	0.001	28	0.005	37	0.009	31	0.003	192
DCP11	.399	0.602	0.382	1	0.035	28	0.008	261	0.001	2	0.001	36	0.004	321	0.006	77	0.008	58	0.003	265
DCP12	.501	0.438	0.295	3	0.027	28	0.007	263	0.001	50	0.005	9	0.006	258	0.003	58	0.006	44	0.005	219
DCP13	.600	0.375	0.211	7	0.026	36	0.009	256	0.003	118	0.005	44	0.002	18	0.007	78	0.007	33	0.007	218
DCP14	.701	0.344	0.132	11	0.030	44	0.010	284	0.001	178	0.004	86	0.009	307	0.003	112	0.011	67	0.001	355
DCP15	.800	0.173	0.073	23	0.022	41	0.008	279	0.004	143	0.005	21	0.005	322	0.001	344	0.012	52	0.004	203
DCP16	.900	-0.067	0.027	33	0.008	45	0.004	232	0.004	222	0.005	51	0.002	162	0.003	85	0.010	82	0.003	215
DCP17	.969	-0.040	0.010	168	0.005	324	0.005	222	0.004	94	0.004	110	0.005	263	0.006	36	0.007	48	0.002	77

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.088	0.397	5.15	0.0	7.50	12015.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.8 (439.0)	34704. (724.8)	0.47E 07	-0.040	1.208	11.96	-0.00085	0.914	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.503	5.147	0	0.252	11	0.051	295	0.019	257	0.015	29	0.014	95	0.028	242	0.022	157	0.002	281
CN		0.773	0.334	9	0.119	22	0.043	278	0.017	160	0.002	53	0.001	22	0.002	297	0.008	133	0.004	351
CM		-0.003	0.013	277	0.011	91	0.011	336	0.009	242	0.004	138	0.002	113	0.001	38	0.005	324	0.001	193
DCP 1	.010	3.581	1.750	351	1.053	68	0.783	330	0.405	269	0.104	202	0.045	279	0.007	227	0.046	164	0.023	62
DCP 2	.020	2.890	1.420	2	0.729	49	0.413	336	0.281	271	0.189	214	0.106	175	0.082	162	0.081	111	0.069	64
DCP 3	.030	2.754	1.328	0	0.560	46	0.313	329	0.213	256	0.149	194	0.116	140	0.081	85	0.071	32	0.057	353
DCP 4	.049	2.449	1.028	1	0.527	48	0.284	323	0.151	236	0.078	157	0.032	106	0.022	107	0.049	36	0.045	347
DCP 5	.074	2.161	0.841	3	0.419	40	0.225	309	0.129	215	0.067	127	0.024	65	0.018	56	0.046	7	0.036	304
DCP 6	.099	1.947	0.754	5	0.343	31	0.187	294	0.114	198	0.059	108	0.029	51	0.021	27	0.052	341	0.036	271
DCP 7	.149	1.455	0.640	6	0.254	20	0.141	273	0.087	169	0.053	77	0.011	352	0.011	28	0.030	331	0.018	246
DCP 8	.200	1.210	0.551	10	0.193	12	0.116	263	0.073	164	0.034	81	0.018	41	0.026	354	0.034	304	0.023	217
DCP 9	.250	1.061	0.518	7	0.147	350	0.084	230	0.060	123	0.026	38	0.015	353	0.024	313	0.025	217	0.020	139
DCP10	.300	0.935	0.434	8	0.118	349	0.068	217	0.049	105	0.026	1	0.008	302	0.011	301	0.017	179	0.009	112
DCP11	.399	0.769	0.345	13	0.092	355	0.050	218	0.038	102	0.019	351	0.007	316	0.016	278	0.029	166	0.013	81
DCP12	.501	0.556	0.248	19	0.079	358	0.035	208	0.033	88	0.018	328	0.004	282	0.008	255	0.026	151	0.008	52
DCP13	.600	0.441	0.165	28	0.067	11	0.023	210	0.024	79	0.018	315	0.005	217	0.003	235	0.022	148	0.010	12
DCP14	.701	0.379	0.098	50	0.055	18	0.017	190	0.027	57	0.019	289	0.004	243	0.003	116	0.017	132	0.006	7
DCP15	.800	0.203	0.072	43	0.025	348	0.023	148	0.021	43	0.010	279	0.001	256	0.006	189	0.017	125	0.007	333
DCP16	.900	-0.034	0.058	13	0.030	269	0.019	129	0.011	32	0.003	299	0.006	312	0.005	160	0.014	98	0.006	303
DCP17	.969	-0.053	0.022	12	0.019	269	0.003	184	0.005	122	0.002	223	0.006	330	0.009	168	0.008	134	0.005	301

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.088	0.397	5.11	0.0	10.00	12019.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.6 (438.2)	34641. (723.5)	0.47E 07	-0.097	1.326	13.89	-0.00110	1.184	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.003	5.112	0	0.248	17	0.020	248	0.034	16	0.044	337	0.042	232	0.016	117	0.023	92	0.009	265
CN		0.897	0.233	36	0.134	35	0.032	1	0.032	304	0.016	213	0.010	177	0.012	65	0.009	77	0.005	342
CM		-0.014	0.032	211	0.026	99	0.007	48	0.012	37	0.010	314	0.003	284	0.005	252	0.004	246	0.002	163
DCP 1	.010	4.007	0.146	323	1.304	81	0.224	86	0.564	72	0.281	5	0.064	50	0.106	3	0.053	58	0.057	4
DCP 2	.020	3.251	0.303	31	0.832	77	0.296	64	0.315	49	0.254	3	0.091	354	0.154	6	0.094	329	0.087	340
DCP 3	.030	3.021	0.233	52	0.802	80	0.362	48	0.284	13	0.169	326	0.074	310	0.091	325	0.083	287	0.071	261
DCP 4	.049	2.756	0.293	43	0.681	67	0.184	22	0.125	16	0.109	323	0.037	261	0.049	338	0.049	280	0.030	245
DCP 5	.074	2.421	0.322	44	0.529	58	0.135	15	0.116	5	0.101	302	0.039	244	0.041	299	0.043	227	0.017	196
DCP 6	.099	2.164	0.350	45	0.450	52	0.106	9	0.110	354	0.107	286	0.045	224	0.025	276	0.033	206	0.014	175
DCP 7	.149	1.663	0.380	38	0.316	40	0.087	358	0.104	328	0.080	256	0.030	210	0.018	232	0.011	188	0.020	218
DCP 8	.200	1.381	0.354	38	0.246	41	0.092	3	0.104	322	0.065	256	0.031	228	0.031	205	0.027	176	0.022	160
DCP 9	.250	1.221	0.380	34	0.203	20	0.065	337	0.092	295	0.074	217	0.036	172	0.030	134	0.031	101	0.022	76
DCP10	.300	1.081	0.348	34	0.175	12	0.059	332	0.087	281	0.064	199	0.024	166	0.026	127	0.027	92	0.015	59
DCP11	.399	0.901	0.312	35	0.128	6	0.038	324	0.066	277	0.050	192	0.029	179	0.040	111	0.029	74	0.012	33
DCP12	.501	0.673	0.260	36	0.100	352	0.023	308	0.054	255	0.046	166	0.017	147	0.030	85	0.024	58	0.016	7
DCP13	.600	0.540	0.209	40	0.075	339	0.013	261	0.044	233	0.041	140	0.013	90	0.025	75	0.018	58	0.013	335
DCP14	.701	0.448	0.147	49	0.065	313	0.021	176	0.031	213	0.036	114	0.009	52	0.019	46	0.014	51	0.013	341
DCP15	.800	0.266	0.128	34	0.061	286	0.019	197	0.031	199	0.029	105	0.011	98	0.024	33	0.008	46	0.008	323
DCP16	.900	0.022	0.123	11	0.053	275	0.019	254	0.027	193	0.020	112	0.010	91	0.014	13	0.006	59	0.011	284
DCP17	.969	-0.035	0.052	7	0.022	287	0.011	288	0.014	199	0.006	102	0.005	109	0.006	77	0.010	96	0.003	324

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.14	0.088	0.396	5.05	0.0	12.47	12015.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.3 (437.3)	34493. (720.4)	0.47E 07	-0.124	1.390	14.45	-0.00169	1.806	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.471	5.054	0	0.250	18	0.032	228	0.012	85	0.060	95	0.005	20	0.047	233	0.016	258	0.011	213
CN		0.984	0.204	72	0.083	62	0.062	59	0.011	24	0.026	358	0.011	287	0.012	268	0.011	289	0.008	199
CM		-0.028	0.059	203	0.021	120	0.018	152	0.006	94	0.012	118	0.006	51	0.003	84	0.003	106	0.002	26
DCP 1	.010	4.379	1.265	189	0.818	110	0.543	163	0.210	165	0.181	175	0.036	198	0.098	196	0.036	250	0.040	174
DCP 2	.020	3.456	0.700	169	0.695	108	0.338	150	0.321	132	0.166	166	0.118	154	0.153	205	0.074	218	0.073	230
DCP 3	.030	3.072	0.851	164	0.652	96	0.312	146	0.331	113	0.129	111	0.155	119	0.078	132	0.087	145	0.058	135
DCP 4	.049	2.875	0.585	145	0.361	90	0.289	123	0.093	74	0.087	123	0.048	56	0.037	201	0.031	185	0.048	176
DCP 5	.074	2.518	0.465	134	0.300	89	0.255	108	0.082	62	0.091	92	0.048	36	0.028	118	0.016	66	0.030	114
DCP 6	.099	2.288	0.398	117	0.259	84	0.232	97	0.077	49	0.094	77	0.052	25	0.026	98	0.023	67	0.043	75
DCP 7	.149	1.788	0.335	90	0.207	73	0.177	74	0.052	26	0.080	51	0.039	351	0.019	68	0.021	358	0.013	46
DCP 8	.200	1.471	0.295	87	0.189	75	0.134	70	0.048	53	0.070	41	0.031	17	0.028	7	0.014	348	0.015	67
DCP 9	.250	1.314	0.324	73	0.171	59	0.139	47	0.048	9	0.067	21	0.040	356	0.031	338	0.028	330	0.017	327
DCP10	.300	1.180	0.318	64	0.142	48	0.128	36	0.046	355	0.078	3	0.049	317	0.041	309	0.034	291	0.014	278
DCP11	.399	1.001	0.304	56	0.089	38	0.104	34	0.038	329	0.067	355	0.047	302	0.040	284	0.028	289	0.026	254
DCP12	.501	0.770	0.282	49	0.061	11	0.076	22	0.030	314	0.054	330	0.034	274	0.034	273	0.021	280	0.022	239
DCP13	.600	0.623	0.251	45	0.054	329	0.050	4	0.023	279	0.043	314	0.029	243	0.021	265	0.011	264	0.019	216
DCP14	.701	0.522	0.216	43	0.067	300	0.044	339	0.027	242	0.041	295	0.029	206	0.010	238	0.009	296	0.012	182
DCP15	.800	0.337	0.204	28	0.066	290	0.045	321	0.019	232	0.045	280	0.027	196	0.011	223	0.010	273	0.012	164
DCP16	.900	0.071	0.168	15	0.036	327	0.052	321	0.017	208	0.029	268	0.019	196	0.010	171	0.006	269	0.006	125
DCP17	.969	-0.014	0.077	13	0.016	351	0.028	332	0.007	262	0.013	266	0.010	219	0.005	215	0.001	9	0.011	147

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.088	0.396	5.05	0.0	15.08	12015.7	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.1 (436.6)	34474. (720.0)	0.47E 07	-0.131	1.339	14.58	-0.00179	1.909	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.032	5.047	0	0.222	7	0.041	230	0.024	207	0.006	274	0.016	117	0.018	152	0.011	133	0.008	290
CN		1.005	0.226	92	0.053	122	0.021	127	0.016	110	0.016	126	0.005	80	0.009	67	0.006	31	0.002	182
CM		-0.049	0.070	197	0.024	217	0.009	175	0.012	214	0.006	250	0.003	295	0.002	257	0.002	289	0.001	333
DCP 1	.010	3.542	2.280	171	0.709	247	0.085	212	0.202	254	0.131	340	0.083	81	0.032	321	0.055	51	0.038	198
DCP 2	.020	3.009	1.602	163	0.576	222	0.241	221	0.232	269	0.128	353	0.068	54	0.052	57	0.048	82	0.037	175
DCP 3	.030	2.783	1.300	163	0.369	207	0.337	192	0.228	245	0.103	264	0.082	338	0.050	28	0.064	73	0.043	130
DCP 4	.049	2.883	0.721	160	0.266	187	0.160	184	0.138	221	0.040	241	0.049	317	0.041	31	0.048	52	0.044	84
DCP 5	.074	2.542	0.548	147	0.246	184	0.110	163	0.127	201	0.040	222	0.036	258	0.031	353	0.043	356	0.036	32
DCP 6	.099	2.318	0.445	128	0.260	185	0.107	136	0.132	193	0.047	221	0.049	231	0.023	322	0.047	319	0.026	3
DCP 7	.149	1.774	0.474	106	0.148	169	0.086	119	0.087	162	0.036	205	0.023	207	0.009	282	0.032	310	0.003	329
DCP 8	.200	1.434	0.440	112	0.148	144	0.098	122	0.076	153	0.044	184	0.020	235	0.019	257	0.021	307	0.031	317
DCP 9	.250	1.310	0.417	100	0.152	115	0.080	110	0.072	119	0.061	149	0.016	130	0.006	159	0.014	275	0.021	281
DCP10	.300	1.184	0.339	91	0.139	104	0.064	108	0.069	99	0.060	132	0.017	113	0.015	122	0.008	208	0.016	223
DCP11	.399	1.032	0.288	75	0.122	89	0.030	95	0.061	83	0.054	128	0.017	96	0.025	113	0.013	116	0.013	212
DCP12	.501	0.829	0.208	56	0.097	74	0.020	29	0.047	57	0.043	108	0.016	59	0.022	94	0.012	71	0.014	176
DCP13	.600	0.686	0.269	44	0.073	56	0.037	336	0.047	42	0.023	78	0.014	47	0.018	69	0.011	55	0.004	110
DCP14	.701	0.589	0.259	34	0.054	45	0.039	327	0.043	16	0.019	52	0.009	62	0.012	43	0.006	107	0.006	107
DCP15	.800	0.415	0.255	20	0.068	21	0.021	330	0.035	16	0.020	36	0.009	76	0.006	24	0.006	100	0.003	123
DCP16	.900	0.151	0.182	14	0.068	33	0.019	30	0.02[illegible]	7	0.022	6	0.006	71	0.005	3	0.008	57	0.006	67
DCP17	.969	0.015	0.070	17	0.036	33	0.006	79	0.007	3	0.004	116	0.005	85	0.010	53	0.003	88	0.002	197

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.089	0.396	5.04	0.0	17.51	12015.8	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.0 (436.5)	34493. (720.4)	0.47E 07	-0.143	1.270	14.77	-0.00247	2.635	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.510	5.044	0	0.214	4	0.049	264	0.003	242	0.029	49	0.023	39	0.032	182	0.003	254	0.004	347
CN		0.995	0.210	92	0.031	152	0.022	203	0.013	225	0.010	269	0.007	291	0.001	124	0.007	349	0.007	330
CM		-0.070	0.056	212	0.030	228	0.011	294	0.004	326	0.003	29	0.003	64	0.000	187	0.002	153	0.001	122
DCP 1	.010	4.677	1.267	169	0.558	252	0.260	316	0.181	13	0.128	104	0.063	190	0.030	238	0.006	339	0.009	95
DCP 2	.020	4.443	1.013	162	0.488	246	0.261	310	0.127	18	0.088	117	0.053	169	0.046	234	0.025	330	0.007	70
DCP 3	.030	2.380	0.998	161	0.481	250	0.192	309	0.088	340	0.058	59	0.043	141	0.036	220	0.025	252	0.007	285
DCP 4	.049	2.574	0.604	167	0.308	232	0.116	297	0.034	277	0.039	347	0.028	86	0.007	186	0.016	12	0.016	347
DCP 5	.074	2.344	0.432	154	0.254	212	0.126	277	0.031	291	0.043	322	0.039	46	0.011	91	0.004	14	0.016	247
DCP 6	.099	2.183	0.318	130	0.247	201	0.143	264	0.040	261	0.043	309	0.035	9	0.015	135	0.018	61	0.007	309
DCP 7	.149	1.733	0.355	97	0.207	193	0.090	244	0.034	282	0.025	316	0.010	32	0.009	108	0.008	309	0.016	323
DCP 8	.200	1.388	0.355	114	0.160	189	0.051	229	0.044	260	0.035	325	0.012	16	0.010	96	0.015	224	0.020	305
DCP 9	.250	1.318	0.368	103	0.135	168	0.074	191	0.053	229	0.035	279	0.027	329	0.011	54	0.001	47	0.013	317
DCP10	.300	1.210	0.320	97	0.102	153	0.070	179	0.053	207	0.034	257	0.022	322	0.003	11	0.011	47	0.009	32
DCP11	.399	1.067	0.283	82	0.066	106	0.068	164	0.041	208	0.028	252	0.023	308	0.005	63	0.013	48	0.014	29
DCP12	.501	0.875	0.263	65	0.093	70	0.056	151	0.027	201	0.016	223	0.018	275	0.005	340	0.017	356	0.017	358
DCP13	.600	0.730	0.247	53	0.107	54	0.043	135	0.015	193	0.009	205	0.016	262	0.005	200	0.017	350	0.010	9
DCP14	.701	0.626	0.236	38	0.106	42	0.029	98	0.008	72	0.005	158	0.012	221	0.004	206	0.007	334	0.005	276
DCP15	.800	0.485	0.209	34	0.095	41	0.026	76	0.015	109	0.010	204	0.012	220	0.002	300	0.013	286	0.009	251
DCP16	.900	0.206	0.135	38	0.071	34	0.019	69	0.018	105	0.005	228	0.009	202	0.005	71	0.002	284	0.010	278
DCP17	.969	0.040	0.060	46	0.028	50	0.011	105	0.010	117	0.005	155	0.004	179	0.004	338	0.007	348	0.005	235

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.14	0.089	0.396	5.08	0.0	19.94	12015.9	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
132.9 (436.1)	34488. (720.3)	0.47E 07	-0.160	1.2	19.50	-0.00348	3.711	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.945	5.081	0	0.228	8	0.048	256	0.008	198	0.024	35	0.012	84	0.034	177	0.018	144	0.009	324
CN		0.999	0.196	85	0.031	118	0.016	113	0.016	83	0.008	137	0.005	1	0.007	119	0.006	131	0.005	296
CM		-0.090	0.048	248	0.010	247	0.006	284	0.004	233	0.002	292	0.002	166	0.002	244	0.001	284	0.001	199
DCP 1	.010	2.123	0.464	157	0.184	265	0.139	43	0.110	136	0.035	247	0.023	77	0.024	185	0.015	308	0.019	42
DCP 2	.020	2.036	0.366	146	0.135	257	0.066	36	0.052	124	0.013	221	0.005	81	0.004	196	0.007	20	0.012	7
DCP 3	.030	2.039	0.331	137	0.185	247	0.082	332	0.053	78	0.011	218	0.007	11	0.016	202	0.018	268	0.006	317
DCP 4	.049	2.379	0.305	170	0.090	142	0.074	274	0.013	8	0.028	83	0.024	238	0.016	181	0.017	153	0.013	188
DCP 5	.074	2.222	0.218	159	0.108	136	0.056	253	0.015	271	0.014	79	0.006	273	0.025	180	0.023	106	0.007	249
DCP 6	.099	2.135	0.101	121	0.122	129	0.079	237	0.025	265	0.007	162	0.017	22	0.011	139	0.018	130	0.006	327
DCP 7	.149	1.673	0.201	68	0.077	145	0.041	132	0.023	22	0.019	206	0.007	60	0.022	179	0.022	176	0.020	282
DCP 8	.200	1.336	0.233	79	0.024	194	0.019	118	0.021	145	0.003	32	0.004	244	0.008	133	0.007	198	0.713	273
DCP 9	.250	1.285	0.265	81	0.036	158	0.029	143	0.019	107	0.002	129	0.007	62	0.018	133	0.009	159	0.003	249
DCP10	.300	1.191	0.259	79	0.039	149	0.025	127	0.019	119	0.006	229	0.000	50	0.012	96	0.005	115	0.006	255
DCP11	.399	1.094	0.265	83	0.039	135	0.035	106	0.037	121	0.016	185	0.003	39	0.012	149	0.006	128	0.010	255
DCP12	.501	0.933	0.256	80	0.035	112	0.028	89	0.036	86	0.018	143	0.003	27	0.010	156	0.008	63	0.005	212
DCP13	.600	0.806	0.243	77	0.045	88	0.031	97	0.032	65	0.025	120	0.009	24	0.014	98	0.006	144	0.005	105
DCP14	.701	0.711	0.225	72	0.050	72	0.022	101	0.027	47	0.020	103	0.008	332	0.016	76	0.008	125	0.010	328
DCP15	.800	0.565	0.195	72	0.051	64	0.025	125	0.015	27	0.008	114	0.010	345	0.014	56	0.010	125	0.013	349
DCP16	.900	0.243	0.133	70	0.031	55	0.013	96	0.007	317	0.005	346	0.011	332	0.009	41	0.004	103	0.004	354
DCP17	.969	0.056	0.062	78	0.012	77	0.007	75	0.005	301	0.003	30	0.002	345	0.005	317	0.005	18	0.004	295

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.086	0.403	5.15	0.0	0.00	12019.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
136.4 (447.5)	48220. (1007.1)	0.64E 07	-0.029	0.595	9.13	-0.00069	0.756	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.003	5.151	0	0.235	8	0.035	264	0.009	195	0.013	20	0.011	68	0.012	214	0.008	227	0.008	295
CN		0.121	0.478	354	0.016	358	0.002	16	0.000	65	0.001	6	0.001	295	0.002	7	0.001	294	0.001	91
CM		-0.015	0.011	308	0.001	332	0.000	138	0.000	257	0.001	176	0.000	138	0.001	214	0.000	144	0.000	226
DCP 1	.010	-0.756	3.446	348	0.287	36	0.079	123	0.013	148	0.011	142	0.013	190	0.038	254	0.002	37	0.000	79
DCP 2	.020	-0.337	2.438	350	0.094	337	0.020	331	0.012	35	0.009	132	0.007	181	0.005	314	0.004	192	0.003	55
DCP 3	.030	-0.046	2.045	350	0.079	325	0.010	340	0.001	327	0.002	187	0.036	187	0.004	289	0.003	154	0.003	89
DCP 4	.049	0.170	1.674	351	0.062	325	0.005	350	0.003	304	0.002	231	0.002	227	0.003	344	0.006	136	0.003	188
DCP 5	.074	0.327	1.345	351	0.049	338	0.007	22	0.001	292	0.001	241	0.002	238	0.002	56	0.001	59	0.003	128
DCP 6	.099	0.364	1.163	351	0.040	339	0.009	349	0.006	247	0.005	187	0.004	14	0.036	314	0.007	189	0.004	138
DCP 7	.149	0.247	0.869	352	0.033	341	0.002	7	0.003	338	0.001	165	0.003	23	0.001	135	0.002	42	0.001	256
DCP 8	.200	0.200	0.712	355	0.029	355	0.003	356	0.001	186	0.001	252	0.002	107	0.032	136	0.007	199	0.003	194
DCP 9	.250	0.186	0.621	353	0.019	1	0.004	291	0.002	248	0.003	339	0.002	264	0.036	21	0.004	348	0.003	42
DCP10	.300	0.187	0.521	354	0.019	1	0.005	5	0.002	200	0.004	332	0.002	213	0.001	65	0.001	73	0.001	79
DCP11	.399	0.169	0.420	359	0.015	18	0.005	1	0.002	273	0.004	44	0.002	315	0.001	234	0.002	229	0.004	73
DCP12	.501	0.117	0.318	0	0.010	1	0.003	56	0.002	63	0.001	348	0.003	310	0.002	25	0.002	241	0.004	125
DCP13	.600	0.137	0.245	2	0.007	349	0.002	68	0.004	55	0.005	58	0.001	338	0.002	97	0.002	342	0.002	117
DCP14	.701	0.193	0.173	3	0.004	69	0.002	38	0.003	133	0.002	324	0.002	285	0.034	25	0.002	288	0.002	5
DCP15	.800	0.090	0.101	7	0.003	114	0.000	308	0.001	70	0.003	286	0.001	330	0.006	344	0.003	77	0.002	310
DCP16	.900	-0.086	0.031	18	0.003	211	0.003	336	0.002	8	0.002	38	0.001	93	0.033	119	0.003	359	0.002	44
DCP17	.969	-0.042	0.021	180	0.003	165	0.005	204	0.002	113	0.002	322	0.001	190	0.036	36	0.005	269	0.001	167

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.087	0.400	5.16	0.0	2.69	12019.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.2 (443.5)	47622. (994.6)	0.64E 07	-0.022	0.835	7.53	-0.03374	0.798	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.485	5.159	0	0.207	11	0.041	268	0.001	31	0.023	1	0.017	111	0.011	235	0.005	142	0.007	288
CN		0.363	0.477	354	0.018	8	0.002	346	0.001	51	0.002	298	0.002	184	0.000	359	0.000	71	0.001	157
CM		-0.010	0.012	307	0.001	288	0.000	10	0.000	225	0.000	169	0.000	211	0.000	345	0.001	196	0.000	349
DCP 1	.010	1.043	3.170	348	0.126	355	0.039	135	0.015	93	0.021	287	0.011	101	0.008	34	0.011	177	0.005	358
DCP 2	.020	0.925	2.466	350	0.098	351	0.029	348	0.006	78	0.018	306	0.005	216	0.003	25	0.010	186	0.004	83
DCP 3	.030	1.010	2.088	350	0.075	349	0.021	328	0.005	44	0.013	297	0.009	203	0.006	347	0.011	207	0.006	73
DCP 4	.049	1.053	1.727	350	0.060	331	0.012	330	0.005	243	0.004	300	0.008	190	0.005	336	0.009	196	0.002	101
DCP 5	.074	1.039	1.370	351	0.049	343	0.009	336	0.004	198	0.004	209	0.005	163	0.006	344	0.008	212	0.002	318
DCP 6	.099	0.967	1.176	351	0.043	357	0.015	333	0.001	92	0.004	262	0.006	148	0.002	3	0.008	211	0.003	289
DCP 7	.149	0.782	0.875	352	0.032	356	0.005	337	0.002	133	0.006	266	0.008	158	0.005	345	0.005	153	0.002	249
DCP 8	.200	0.566	0.717	354	0.030	11	0.005	2	0.001	245	0.004	278	0.001	3	0.002	254	0.006	213	0.001	284
DCP 9	.250	0.480	0.620	353	0.027	17	0.002	48	0.004	28	0.002	343	0.004	262	0.003	353	0.002	218	0.003	37
DCP10	.300	0.442	0.516	354	0.021	16	0.004	18	0.002	55	0.002	258	0.002	211	0.002	34	0.002	7	0.005	129
DCP11	.399	0.374	0.415	359	0.018	30	0.002	13	0.001	89	0.002	256	0.003	228	0.001	111	0.002	79	0.004	183
DCP12	.501	0.273	0.315	0	0.015	35	0.004	326	0.003	355	0.001	325	0.001	52	0.001	270	0.002	32	0.005	179
DCP13	.600	0.254	0.243	2	0.011	38	0.002	230	0.002	6	0.003	333	0.001	37	0.002	34	0.004	354	0.001	138
DCP14	.701	0.275	0.165	4	0.013	36	0.002	21	0.002	45	0.002	18	0.001	199	0.003	170	0.002	342	0.003	90
DCP15	.800	0.135	0.097	8	0.004	60	0.003	148	0.003	111	0.004	336	0.002	282	0.001	35	0.005	29	0.002	97
DCP16	.900	-0.074	0.036	16	0.001	327	0.003	289	0.003	281	0.001	157	0.004	141	0.000	165	0.002	25	0.003	266
DCP17	.969	-0.047	0.016	176	0.008	251	0.002	66	0.007	69	0.003	278	0.003	28	0.001	9	0.002	285	0.001	289

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.088	0.398	5.16	0.0	4.98	14019.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.2 (440.4)	47105. (983.8)	0.64E 07	-0.022	1.059	10.14	-0.00089	0.956	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.976	5.162	0	0.239	9	0.039	235	0.013	333	0.013	21	0.003	241	0.007	248	0.009	301	0.003	81
CN		0.612	0.496	355	0.034	19	0.007	288	0.002	166	0.002	96	0.001	287	0.001	2	0.006	295	0.002	57
CM		-0.004	0.016	315	0.004	241	0.001	87	0.001	336	0.001	268	0.000	144	0.000	172	0.002	147	0.001	286
DCP 1	.010	2.914	3.464	349	0.280	287	0.061	176	0.061	233	0.087	145	0.055	55	0.026	332	0.008	217	0.028	312
DCP 2	.020	2.203	2.431	351	0.133	344	0.059	194	0.087	83	0.091	347	0.006	253	0.009	166	0.018	134	0.012	51
DCP 3	.030	2.063	2.009	351	0.126	21	0.039	327	0.016	257	0.012	155	0.001	23	0.001	137	0.009	220	0.009	353
DCP 4	.049	1.940	1.684	351	0.099	14	0.048	325	0.014	248	0.007	187	0.004	88	0.004	38	0.012	218	0.003	34
DCP 5	.074	1.749	1.330	351	0.078	11	0.028	315	0.004	256	0.003	233	0.004	175	0.004	297	0.012	213	0.001	46
DCP 6	.099	1.567	1.129	352	0.073	17	0.017	313	0.004	211	0.004	207	0.001	118	0.001	8	0.011	214	0.005	47
DCP 7	.149	1.153	0.845	353	0.054	11	0.012	286	0.002	35	0.003	331	0.000	352	0.001	121	0.012	198	0.006	20
DCP 8	.200	0.934	0.691	356	0.045	20	0.008	287	0.001	44	0.003	341	0.002	317	0.002	297	0.012	191	0.003	77
DCP 9	.250	0.811	0.592	355	0.044	14	0.003	237	0.002	82	0.001	3	0.005	229	0.002	95	0.006	309	0.004	58
DCP10	.300	0.719	0.492	355	0.039	22	0.004	290	0.004	116	0.004	98	0.003	287	0.001	52	0.009	305	0.005	28
DCP11	.399	0.592	0.389	1	0.038	33	0.004	286	0.005	146	0.006	122	0.001	254	0.003	69	0.011	309	0.005	91
DCP12	.501	0.437	0.298	2	0.025	31	0.006	305	0.003	171	0.001	170	0.003	279	0.001	290	0.010	318	0.001	116
DCP13	.600	0.374	0.218	5	0.027	38	0.005	296	0.002	194	0.004	78	0.002	106	0.002	253	0.008	317	0.001	51
DCP14	.701	0.354	0.141	10	0.024	42	0.008	280	0.004	189	0.002	113	0.003	340	0.000	235	0.005	343	0.002	88
DCP15	.800	0.180	0.078	19	0.023	49	0.008	277	0.004	170	0.006	69	0.000	164	0.002	31	0.010	316	0.001	177
DCP16	.900	-0.058	0.027	27	0.011	38	0.003	235	0.003	117	0.001	183	0.002	307	0.001	1	0.009	325	0.001	82
DCP17	.969	-0.066	0.012	157	0.005	336	0.002	165	0.000	132	0.006	92	0.001	359	0.002	228	0.008	318	0.003	278

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.15	0.088	0.398	5.16	0.0	7.48	12019.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
134.6 (439.6)	47009. (981.8)	0.64E 07	-0.019	1.211	12.16	-0.00108	1.144	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.478	5.161 0	0.234 14	0.029 293	0.023 264	0.020 54	0.009 C	0.017 306	0.001 107	0.005 185
CN		0.788	0.336 8	0.113 24	0.042 274	0.016 152	0.004 8	0.002 104	0.005 22	0.005 61	0.001 196
CM		0.001	0.010 307	0.005 129	0.008 353	0.007 245	0.004 137	0.002 40	0.000 271	0.002 265	0.001 247
DCP 1	.010	3.830	2.150 349	0.641 72	0.728 357	0.414 277	0.127 211	0.033 287	0.007 249	0.094 147	0.047 82
DCP 2	.020	3.001	1.739 358	0.527 42	0.272 336	0.215 280	0.200 212	0.119 135	0.010 110	0.062 127	0.062 67
DCP 3	.030	2.903	1.689 359	0.421 26	0.214 302	0.139 227	0.096 168	0.082 111	0.003 46	0.045 3	0.035 382
DCP 4	.049	2.586	1.281 359	0.372 36	0.168 307	0.087 220	0.053 144	0.038 88	0.027 31	0.020 15	0.025 309
DCP 5	.074	2.263	1.008 0	0.295 29	0.143 292	0.078 194	0.054 112	0.031 45	0.022 1	0.021 344	0.031 269
DCP 6	.099	1.994	0.893 1	0.265 29	0.124 289	0.074 189	0.050 101	0.034 23	0.019 325	0.009 306	0.015 251
DCP 7	.149	1.616	0.636 3	0.205 25	0.100 279	0.059 176	0.032 83	0.019 352	0.002 321	0.007 36	0.012 243
DCP 8	.200	1.204	0.542 7	0.165 18	0.084 267	0.051 161	0.027 65	0.008 342	0.011 58	0.011 334	0.018 239
DCP 9	.250	1.049	0.477 7	0.144 8	0.074 246	0.049 128	0.028 18	0.007 257	0.009 22	0.010 317	0.020 190
DCP10	.300	0.911	0.386 9	0.126 10	0.059 245	0.039 120	0.024 8	0.008 269	0.006 354	0.006 312	0.010 176
DCP11	.399	0.740	0.299 16	0.110 17	0.050 245	0.034 118	0.021 358	0.015 241	0.006 85	0.006 45	0.007 166
DCP12	.501	0.540	0.220 21	0.089 17	0.038 246	0.025 108	0.015 324	0.010 225	0.007 18	0.000 211	0.008 113
DCP13	.600	0.436	0.152 31	0.078 22	0.030 244	0.024 94	0.017 314	0.010 211	0.003 356	0.006 125	0.006 75
DCP14	.701	0.383	0.618 57	0.068 19	0.020 231	0.023 69	0.019 306	0.011 184	0.004 72	0.008 117	0.007 41
DCP15	.800	0.202	0.062 96	0.032 11	0.019 173	0.022 49	0.017 284	0.007 173	0.004 15	0.008 7	0.004 32
DCP16	.900	-0.032	0.053 25	0.026 275	0.025 145	0.012 17	0.004 196	0.005 [illegible]	0.004 141	0.012 62	0.002 340
DCP17	.969	-0.052	0.013 13	0.019 276	0.014 166	0.001 46	0.003 71	0.001 182	0.001 196	0.015 82	0.003 341

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.08	0.088	0.396	5.11	0.0	9.96	12019.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
133.4 (437.6)	46750. (976.4)	0.63E 07	-0.000	1.307	13.56	-0.00127	1.358	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.956	5.111 0	0.240 20	0.015 287	0.036 4	0.040 316	0.038 183	0.009 144	0.003 120	0.005 279
CN		0.982	0.231 37	0.135 32	0.020 6	0.031 314	0.017 209	0.009 [illegible]	0.011 53	0.004 10	0.001 235
CM		-0.000	0.025 228	0.015 103	0.009 22	0.007 35	0.009 349	0.004 262	0.004 218	0.001 174	0.001 140
DCP 1	.010	4.416	0.680 333	1.519 90	0.419 42	0.26[illegible] 74	0.220 36	0.047 28	0.103 69	0.118 21	0.023 326
DCP 2	.020	3.567	0.669 11	0.739 76	0.325 50	0.190 13	0.136 14	0.105 326	0.072 0	0.102 334	0.059 291
DCP 3	.030	3.231	0.522 11	0.697 80	0.396 47	0.329 3	0.222 318	0.[illegible]37 269	0.059 255	0.040 295	0.055 238
DCP 4	.049	2.919	0.499 30	0.648 58	0.211 2	0.106 323	0.066 290	0.050 [illegible]78	0.004 284	0.031 303	0.020 226
DCP 5	.074	2.492	0.398 38	0.526 53	0.150 358	0.088 336	0.079 295	0.05[illegible] 239	0.014 246	0.032 248	0.052 188
DCP 6	.099	2.176	0.349 43	0.432 58	0.095 359	0.084 347	0.078 276	0.046 222	0.017 238	0.030 281	0.041 143
DCP 7	.149	1.648	0.344 41	0.318 38	0.060 346	0.073 334	0.066 266	0.037 188	0.001 229	0.021 183	0.036 118
DCP 8	.200	1.358	0.337 39	0.248 35	0.040 351	0.068 332	0.057 249	0.030 177	0.006 104	0.011 140	0.019 82
DCP 9	.250	1.241	0.347 35	0.197 21	0.037 336	0.068 306	0.060 219	0.030 154	0.014 115	0.021 107	0.019 44
DCP10	.300	1.061	0.318 36	0.167 11	0.027 309	0.052 294	0.048 201	0.023 137	0.011 102	0.015 81	0.007 14
DCP11	.399	0.873	0.287 40	0.134 5	0.017 279	0.042 292	0.041 197	0.020 147	0.020 101	0.013 66	0.009 9
DCP12	.501	0.661	0.246 40	0.107 354	0.013 241	0.035 276	0.041 177	0.019 114	0.022 65	0.014 31	0.010 333
DCP13	.600	0.522	0.187 49	0.082 343	0.011 189	0.023 271	0.033 148	0.015 82	0.020 55	0.014 354	0.007 277
DCP14	.701	0.441	0.137 62	0.065 326	0.030 167	0.016 248	0.034 133	0.015 65	0.017 43	0.013 341	0.005 310
DCP15	.800	0.258	0.115 45	0.062 298	0.023 165	0.019 207	0.026 116	0.013 67	0.020 24	0.009 [illegible]95	0.005 289
DCP16	.900	0.015	0.109 15	0.054 278	0.017 218	0.025 199	0.018 182	0.010 78	0.017 355	0.004 342	0.005 295
DCP17	.969	-0.036	0.053 8	0.032 281	0.010 263	0.011 201	0.007 110	0.009 100	0.010 28	0.006 271	0.005 284

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.085	0.408	5.05	0.0	12.00	12021.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
13..7 (451.9)	49125. (1026.0)	0.65E 07	-0.110	1.337	14.49	-0.00163	1.802	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
MA		11.462	5.047		0.230	9	0.039	166	0.029	54	0.028	102	0.008	7	0.041	307	0.043	218	0.023	216
CN		0.981	0.2..	75	0.076	49	0.047	74	0.016	38	0.024	357	0.011	294	0.007	280	0.012	245	0.010	227
CM		-0.024	0.051	207	0.022	112	0.011	153	0.008	101	0.008	120	0.006	67	0.003	36	0.005	20	0.003	29
DCP 1	.010	4.591	0.932	154	0.718	106	0.461	175	0.247	165	0.146	.07	0.132	187	0.033	232	0.067	220	0.033	169
DCP 2	.020	3.640	0.430	147	0....	105	0.241	142	0.275	140	0.140	.62	0.144	165	0.105	2..	0.112	213	0.088	212
DCP 3	.030	3.172	0.442	168	0.731	107	3..	1	0.218	118	0.198	103	0.119	88	0.065	108	0.065	116	0.035	108
DCP 4	.049	2.871	0 75	143	0.531	83	0.14	.01	0.159	88	0.0..	62	0.057	66	0.050	55	0.618	11	0.013	138
DCP 5	.074	2.448	0.520	132	0.398	71	0.15.	107	0.135	69	0.053	46	0.049	62	0.046	42	0.025	25	0.019	45
DCP 6	.099	2.178	0.463	124	0.29	63	0.142	117	0.114	68	0.0..	60	0.056	38	0.034	17	0.025	354	0.004	319
DCP 7	.149	1.70.	0.373	97	0.195	50	0.125	96	0.071	..	0.044	47	0.044	5	0.027	346	0.023	317	0.004	311
DCP 8	.200	1.437	0.315	84	0.140	56	0.120	86	0.065	38	0.051	31	0.041	357	0.026	342	0.020	320	0.015	281
DCP 9	.250	1.305	0.296	70	0.127	50	0.104	67	0.047	24	0.055	23	0.048	338	0.024	312	0.013	320	0.015	284
DCP10	.300	1.144	0.241	62	0.104	36	0.087	47	0.043	353	0.047	353	0.038	313	0.028	291	0.017	257	0.017	246
DCP11	.399	0.959	0.297	56	0.072	8	0.066	50	0.034	342	0.04.	353	0.032	289	0.016	289	0.019	242	0.018	276
DCP12	.501	0.7..	0.262	51	0.054	339	0.048	47	0.021	330	0.048	338	0.028	288	0.015	277	0.023	231	0.024	238
DCP13	.600	0.608	0.231	53	0.061	319	0.037	30	0.023	278	0.037	3..	0.028	246	0.015	229	0.021	210	0.017	207
DCP14	.701	0.497	0.190	55	0.067	298	0.027	354	0.031	253	0.033	3..	0.023	229	.014	222	0.021	188	0.014	201
DCP15	.800	0.310	0.174	34	0.059	302	0.037	325	0.024	257	0.029	282	0.017	233	.017	198	0.016	181	0.008	182
DCP16	.900	0.061	0.155	17	0.037	314	0.031	310	0.012	287	0.019	265	0.017	222	0..13	164	0.025	198	0.011	177
DCP17	.969	-0.012	0.075	11	0.016	316	0.019	329	0.008	342	0.010	301	0.010	258	0.003	177	0.016	196	0.003	163

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.086	0.404	5.01	0.0	15.02	12021.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.2 (447.0)	48321. (1009.2)	0.64E 07	-0.120	1.295	14.56	-0.00178	1.947	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.025	5.012	0	0.211	9	0.037	195	0.023	178	0.031	274	0.039	141	0.037	321	0.008	209	0.013	332
CN		0.972	0.242	94	0.042	131	0.014	118	0.025	96	0.012	177	0.015	92	0.014	343	0.004	222	0.002	42
CM		-0.042	0.072	198	0.011	202	0.011	173	0.012	213	0.003	257	0.005	229	0.003	157	0.002	0	0.001	71
DCP 1	.010	4.534	1.693	186	0.159	231	0.173	190	0.164	298	0.055	4	0.051	38	0.068	60	0.026	49	0.033	125
DCP 2	.020	3.639	1.111	165	0.323	167	0.249	.44	0.146	283	0.111	358	0.081	65	0.078	41	0.025	71	0.033	111
DCP 3	.030	3.109	1.113	175	0.365	161	0.453	..2	0.239	7 7	0.193	267	0.087	239	0.094	337	0.033	298	0.030	60
DCP .	.049	2.632	1.151	155	0.232	138	0.238	158	0.115	176	0.045	193	0.035	231	0.015	50	0.031	12	0.026	89
DCP 5	.074	2.226	0.977	145	0.121	107	0.222	146	0.093	192	0.067	194	0.051	215	0.020	295	0.032	304	0.021	9
DCP 6	.099	2.002	0.819	136	0.112	188	0.170	134	0.089	188	0.042	184	0.033	180	0.035	317	0.030	309	0.025	351
DCP 7	.149	1.616	0.554	119	0.093	178	0.101	117	0.060	158	0.035	216	0.026	125	0.012	.	0.015	326	0.008	68
DCP 8	.200	1.417	0.420	107	0.096	158	0.065	120	0.070	138	0.045	208	0.029	111	0.012	..	0.007	339	0.010	86
DCP 9	.250	1.280	0.392	92	0.110	141	0.035	..	0.083	129	0.036	186	0.036	124	0.006	24.	0.010	177	0.006	295
DCP10	.300	1.157	0.357	81	0.091	121	0.037	46	0.068	104	0.024	157	0.040	98	0.012	4	0.005	160	0.007	244
DCP11	.399	1.011	0.332	66	0.067	95	0.032	21	0.055	84	0.024	141	0.029	96	0.016	17	0.023	199	0.005	169
DCP12	.501	0.815	0.295	52	0.039	69	0.024	1	0.057	61	0.015	131	0.021	63	0.020	9	0.013	173	0.007	0
DCP13	.600	0.667	0.267	45	0.017	58	0.029	344	0.045	50	0.011	117	0.018	83	0.021	346	0.019	173	0.006	140
DCP14	.701	0.545	0.234	39	0.015	338	0.038	345	0.046	24	0.005	89	0.017	50	0.021	344	0.003	140	0.002	274
DCP15	.800	0.373	0.228	26	0.028	11	0.031	345	0.037	20	0.009	68	0.020	34	0.017	321	0.0..	287	0....	2
DCP16	.900	0.121	0.177	15	0.056	32	0.021	2	0.027	2	0.012	43	0.014	33	0.004	300	0.006	331	0.005	287
DCP17	.969	0.016	0.079	17	0.034	44	0.006	23	0.014	37	0.006	356	0.007	39	0.003	279	0.004	182	0.002	164

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.88	0.086	0.402	5.01	0.0	17.51	12021.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.3 (444.0)	47808. (998 ,	0.64E 07	-0.134	1.258	15.24	-0.00227	2.470	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.514	5.007	0	0.200	3	0.044	244	0.023	346	0.018	346	0.021	93	0.035	322	0.002	153	0.015	321
CN		0.953	0.231	90	0.042	118	0.034	181	0.013	263	0.006	252	0.009	249	0.006	344	0.007	202	0.007	341
CM		-0.062	0.065	204	0.023	228	0.009	271	0.007	327	0.004	0	0.003	356	0.001	96	0.002	7	0.002	154
DCP 1	.010	3.895	1.657	187	0.332	279	0.180	8	0.085	14	0.064	47	0.019	90	0.011	257	0.014	118	0.008	162
DCP 2	.020	3.283	1.214	173	0.201	246	0.167	306	0.142	7	0.089	79	0.051	160	0.033	210	0.028	227	0.012	231
DCP 3	.030	2.785	1.237	173	0.334	269	0.317	246	0.272	320	0.042	20	0.056	29	0.038	134	0.007	21	0.020	141
DCP 4	.049	2.347	1.011	153	0.285	205	0.176	216	0.064	289	0.025	355	0.021	295	0.010	11	0.030	236	0.017	298
DCP 5	.074	1.982	0.800	137	0.283	205	0.115	223	0.073	288	0.042	334	0.046	321	0.030	13	0.013	190	0.007	284
DCP 6	.099	1.787	0.637	126	0.262	195	0.110	234	0.054	310	0.030	323	0.043	318	0.032	6	0.014	117	0.007	45
DCP 7	.149	1.495	0.435	105	0.162	174	0.093	223	0.057	303	0.019	341	0.019	302	0.011	1	0.003	288	0.003	279
DCP 8	.200	1.345	0.349	96	0.133	158	0.099	214	0.059	281	0.026	308	0.020	302	0.010	341	0.010	186	0.008	245
DCP 9	.250	1.264	0.344	85	0.117	135	0.085	184	0.036	264	0.028	268	0.027	245	0.017	300	0.012	267	0.009	332
DCP10	.300	1.159	0.322	77	0.109	111	0.089	165	0.025	243	0.016	263	0.021	272	0.017	345	0.010	325	0.009	12
DCP11	.399	1.028	0.310	67	0.105	84	0.068	146	0.021	235	0.013	256	0.021	261	0.005	3	0.002	232	0.016	27
DCP12	.501	0.843	0.274	56	0.091	69	0.051	137	0.027	189	0.024	229	0.017	214	0.005	339	0.011	216	0.009	49
DCP13	.600	0.700	0.269	46	0.083	54	0.033	111	0.023	168	0.018	197	0.014	182	0.006	357	0.011	191	0.008	1
DCP14	.701	0.592	0.248	38	0.079	48	0.023	80	0.022	143	0.012	163	0.013	187	0.005	349	0.014	205	0.018	313
DCP15	.800	0.443	0.228	32	0.070	49	0.022	69	0.026	126	0.013	143	0.013	149	0.006	261	0.007	185	0.013	310
DCP16	.900	0.186	0.140	35	0.053	36	0.017	75	0.011	144	0.014	153	0.010	166	0.004	194	0.012	159	0.005	334
DCP17	.969	0.044	0.051	48	0.019	24	0.010	107	0.006	122	0.004	142	0.001	14	0.004	148	0.008	178	0.001	336

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.80	0.086	0.401	4.81	0.0	19.93	12021.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.0 (443.0)	47737. (997.0)	0.64E 07	-0.130	1.137	19.91	-0.00250	2.7[illegible]	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.931	4.814	0	0.135	358	0.034	283	0.007	149	0.028	339	0.017	122	0.010	341	0.029	56	0.011	268
CN		0.939	0.167	89	0.016	53	0.021	132	0.008	232	0.001	240	0.003	149	0.001	54	0.011	24	0.006	127
CM		-0.077	0.044	222	0.011	223	0.004	301	0.002	23	0.001	65	0.001	278	0.001	175	0.005	206	0.001	306
DCP 1	.010	.162	1.223	187	0.162	8	0.112	319	0.092	62	0.044	108	0.040	221	0.026	176	0.019	271	0.044	115
DCP 2	.020	2.744	0.923	171	0.144	324	0.009	326	0.059	33	0.030	147	0.028	249	0.043	283	0.016	123	0.012	246
DCP 3	.030	2.350	0.883	164	0.360	269	0.099	55	0.048	257	0.087	35	0.033	146	0.038	333	0.028	90	0.017	283
DCP 4	.049	2.055	0.506	154	0.147	247	0.052	174	0.036	273	0.021	145	0.005	317	0.023	154	0.027	317	0.017	66
DCP 5	.074	1.820	0.338	133	0.114	207	0.047	182	0.033	268	0.013	165	0.007	40	0.024	136	0.018	302	0.073	59
DCP 6	.099	1.716	0.275	114	0.070	180	0.042	151	0.012	288	0.015	113	0.005	32	0.031	125	0.011	271	0.015	35
DCP 7	.149	1.504	0.240	88	0.062	131	0.025	122	0.019	338	0.015	83	0.002	53	0.017	115	0.003	189	0.005	11
DCP 8	.200	1.377	0.234	88	0.037	107	0.006	79	0.007	265	0.007	36	0.007	184	0.011	187	0.009	112	0.012	181
DCP 9	.250	1.256	0.210	83	0.031	103	0.038	155	0.018	205	0.009	282	0.005	138	0.008	295	0.004	353	0.007	249
DCP10	.300	1.148	0.199	79	0.023	99	0.031	144	0.018	200	0.013	292	0.003	188	0.002	284	0.001	186	0.007	212
DCP11	.399	1.028	0.211	72	0.038	75	0.038	131	0.013	204	0.007	330	0.004	222	0.014	344	0.012	39	0.006	188
DCP12	.501	0.863	0.193	66	0.035	56	0.032	134	0.019	214	0.006	270	0.007	131	0.003	356	0.016	37	0.010	166
DCP13	.600	0.732	0.196	60	0.040	44	0.024	134	0.039	215	0.010	249	0.003	227	0.002	299	0.017	24	0.012	118
DCP14	.701	0.643	0.183	54	0.054	28	0.017	118	0.036	243	0.006	226	0.006	149	0.003	284	0.018	25	0.007	108
DCP15	.800	0.497	0.172	51	0.047	35	0.013	118	0.002	189	0.007	198	0.002	126	0.002	146	0.021	31	0.003	127
DCP16	.900	0.209	0.118	59	0.024	27	0.008	89	0.007	233	0.002	205	0.006	65	0.008	54	0.021	17	0.007	27
DCP17	.969	0.050	0.056	75	0.005	343	0.006	91	0.005	125	0.004	67	0.003	26	0.003	336	0.019	12	0.001	198

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.84	0.085	0.405	5.15	0.0	0.02	12023.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
136.6 (448.3)	53458. (1116.5)	0.71E 07	-0.031	0.595	9.14	-0.00070	0.773	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.017	5.150	0	0.243	8	0.038	250	0.013	258	0.011	47	0.010	110	0.014	167	0.012	163	0.008	231
CN		0.115	0.480	354	0.018	359	0.001	216	0.002	293	0.000	25	0.001	236	0.002	91	0.005	142	0.002	226
CM		-0.015	0.011	306	0.001	309	0.001	33	0.001	128	0.000	254	0.000	116	0.001	314	0.002	1	0.001	50
DCP 1	.010	-0.776	3.472	347	0.301	38	0.092	126	0.019	188	0.007	168	0.018	170	0.009	301	0.019	28	0.007	66
DCP 2	.020	-0.372	2.448	350	0.091	339	0.016	330	0.012	16	0.005	105	0.010	177	0.006	9	0.019	67	0.003	89
DCP 3	.030	-0.071	2.049	350	0.079	325	0.009	330	0.003	256	0.002	269	0.009	171	0.002	354	0.012	71	0.003	73
DCP 4	.049	0.144	1.673	350	0.066	320	0.006	325	0.002	295	0.001	92	0.007	177	0.006	18	0.015	59	0.004	97
DCP 5	.074	0.310	1.347	350	0.048	342	0.006	324	0.005	17	0.004	288	0.003	201	0.006	357	0.013	86	0.003	28
DCP 6	.099	0.349	1.167	351	0.040	342	0.009	327	0.006	260	0.002	151	0.002	184	0.006	359	0.012	39	0.001	176
DCP 7	.149	0.239	0.871	351	0.032	352	0.002	276	0.000	27	0.001	159	0.001	298	0.004	5	0.014	59	0.003	220
DCP 8	.200	0.190	0.711	354	0.025	351	0.000	142	0.002	255	0.001	297	0.003	236	0.001	301	0.011	73	0.002	156
DCP 9	.250	0.174	0.624	353	0.024	347	0.001	26	0.005	236	0.002	257	0.004	239	0.003	80	0.007	152	0.002	28
DCP10	.300	0.182	0.523	353	0.017	353	0.001	23	0.001	295	0.003	340	0.003	208	0.002	48	0.007	168	0.001	269
DCP11	.399	0.169	0.421	358	0.016	5	0.002	335	0.001	7	0.000	242	0.003	359	0.003	110	0.012	173	0.002	316
DCP12	.501	0.114	0.322	359	0.014	6	0.002	198	0.006	293	0.002	266	0.004	253	0.006	98	0.007	185	0.002	239
DCP13	.600	0.131	0.244	2	0.012	12	0.003	239	0.002	281	0.002	34	0.001	191	0.006	129	0.006	172	0.004	200
DCP14	.701	0.193	0.177	3	0.006	45	0.003	202	0.002	322	0.002	110	0.001	25	0.002	83	0.009	175	0.001	202
DCP15	.800	0.083	0.103	6	0.005	67	0.001	98	0.003	325	0.002	144	0.001	287	0.005	159	0.005	183	0.004	226
DCP16	.900	-0.084	0.030	16	0.001	48	0.002	189	0.003	309	0.003	300	0.001	260	0.002	108	0.011	166	0.006	224
DCP17	.969	-0.043	0.017	183	0.004	189	0.004	211	0.001	268	0.006	85	0.004	268	0.001	225	0.003	96	0.003	287

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.086	0.403	5.15	0.0	4.22	12023.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
135.8 (445.5)	52501. (1096.5)	0.70E 07	-0.020	0.828	9.35	-0.00060	0.559	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.221	5.153	0	0.203	16	0.031	283	0.002	202	0.022	0	0.013	169	0.005	195	0.012	189	0.007	342
CN		0.386	0.447	355	0.017	11	0.005	353	0.000	155	0.002	315	0.001	286	0.002	68	0.002	113	0.001	21
CM		-0.008	0.008	283	0.002	255	0.001	204	0.000	105	0.001	209	0.001	166	0.000	275	0.001	269	0.000	218
DCP 1	.010	1.236	2.764	348	0.128	0	0.041	164	0.031	112	0.025	256	0.020	221	0.015	6	0.007	194	0.001	272
DCP 2	.020	1.072	2.151	352	0.086	343	0.038	171	0.016	127	0.024	299	0.008	275	0.015	354	0.009	182	0.003	244
DCP 3	.030	1.107	1.810	351	0.065	313	0.029	335	0.010	133	0.021	290	0.005	236	0.008	54	0.012	190	0.005	181
DCP 4	.049	1.127	1.526	351	0.061	318	0.014	333	0.010	285	0.005	312	0.010	165	0.004	304	0.007	265	0.001	276
DCP 5	.074	1.099	1.225	352	0.035	337	0.004	300	0.004	303	0.004	70	0.007	139	0.001	326	0.004	219	0.002	21
DCP 6	.099	1.029	1.055	353	0.030	355	0.011	335	0.002	276	0.003	239	0.000	152	0.002	6	0.004	182	0.001	259
DCP 7	.149	0.763	0.792	354	0.023	11	0.006	330	0.003	283	0.003	342	0.006	217	0.002	304	0.006	253	0.004	320
DCP 8	.200	0.632	0.649	357	0.027	15	0.007	336	0.005	59	0.003	285	0.002	302	0.003	334	0.002	245	0.002	122
DCP 9	.250	0.496	0.623	353	0.024	10	0.009	351	0.000	21	0.003	299	0.005	259	0.002	354	0.003	113	0.001	90
DCP10	.300	0.459	0.521	354	0.022	17	0.009	333	0.002	143	0.002	283	0.001	158	0.003	46	0.001	67	0.005	306
DCP11	.399	0.390	0.417	358	0.020	28	0.005	340	0.002	168	0.005	303	0.001	298	0.006	90	0.004	98	0.001	122
DCP12	.501	0.281	0.321	0	0.013	28	0.004	4	0.001	227	0.004	357	0.003	294	0.002	47	0.003	71	0.002	137
DCP13	.600	0.256	0.242	2	0.011	40	0.006	5	0.003	197	0.000	32	0.004	322	0.002	82	0.007	76	0.003	186
DCP14	.701	0.285	0.166	4	0.014	46	0.005	19	0.001	29	0.000	286	0.003	284	0.003	140	0.008	132	0.003	76
DCP15	.800	0.136	0.099	8	0.011	62	0.004	14	0.001	79	0.002	1	0.002	352	0.003	7	0.004	93	0.002	44
DCP16	.900	-0.069	0.034	10	0.004	356	0.002	42	0.004	293	0.004	63	0.001	46	0.002	317	0.002	154	0.006	349
DCP17	.969	-0.052	0.017	164	0.001	104	0.002	95	0.004	92	0.004	333	0.006	15	0.002	99	0.004	90	0.002	18

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.087	0.398	5.17	0.0	4.99	12023.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
134.2 (440.3)	51940. (1084.8)	0.70E 07	-0.022	1.066	10.13	-0.00087	0.934	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.990	5.170	0	0.239	12	0.045	249	0.011	315	0.016	36	0.011	10	0.015	179	0.025	293	0.002	141
CN		0.616	0.459	355	0.035	19	0.008	300	0.004	178	0.002	55	0.002	276	0.001	125	0.008	269	0.000	211
CM		-0.005	0.016	316	0.004	236	0.001	111	0.001	332	0.001	215	0.000	94	0.000	84	0.003	82	0.000	221
DCP 1	.010	2.947	3.486	349	0.271	287	0.050	167	0.074	232	0.092	143	0.058	52	0.027	340	0.014	336	0.021	277
DCP 2	.020	2.205	2.449	351	0.131	351	0.044	192	0.073	86	0.091	346	0.086	251	0.053	155	0.021	62	0.008	110
DCP 3	.030	2.063	2.026	351	0.126	21	0.039	337	0.021	247	0.011	149	0.002	273	0.005	89	0.005	38	0.003	15
DCP 4	.049	1.938	1.703	351	0.101	18	0.042	332	0.019	249	0.008	156	0.003	147	0.005	26	0.005	278	0.002	46
DCP 5	.074	1.751	1.336	351	0.076	11	0.028	324	0.009	234	0.001	140	0.002	189	0.001	314	0.005	315	0.001	119
DCP 6	.099	1.574	1.137	352	0.075	19	0.017	324	0.007	213	0.002	113	0.003	219	0.002	26	0.005	297	0.001	241
DCP 7	.149	1.156	0.852	353	0.055	11	0.011	299	0.001	213	0.002	35	0.004	299	0.005	70	0.005	287	0.001	295
DCP 8	.200	0.936	0.696	355	0.049	21	0.005	350	0.002	168	0.003	42	0.003	284	0.004	96	0.005	349	0.001	175
DCP 9	.250	0.812	0.597	354	0.046	17	0.009	268	0.004	131	0.004	305	0.003	262	0.002	241	0.009	234	0.000	51
DCP10	.300	0.729	0.494	355	0.039	17	0.009	269	0.003	131	0.002	40	0.002	259	0.001	300	0.010	247	0.001	203
DCP11	.399	0.603	0.390	0	0.033	27	0.008	300	0.003	151	0.002	27	0.001	256	0.002	178	0.012	270	0.002	190
DCP12	.501	0.445	0.299	2	0.029	35	0.006	289	0.002	143	0.001	80	0.002	312	0.002	119	0.007	286	0.002	173
DCP13	.600	0.373	0.221	5	0.029	39	-.007	278	0.003	146	0.002	120	0.003	294	0.002	121	0.010	276	0.002	147
DCP14	.701	0.359	0.139	9	0.031	44	0.007	316	0.008	182	0.002	33	0.000	284	0.002	218	0.012	292	0.001	275
DCP15	.800	0.177	0.078	16	0.025	43	0.007	303	0.005	162	0.007	33	0.002	245	0.002	322	0.012	257	0.002	341
DCP16	.900	-0.055	0.030	22	0.009	18	0.005	273	0.002	185	0.002	152	0.001	266	0.002	117	0.012	261	0.003	57
DCP17	.969	-0.059	0.014	162	0.007	321	0.003	336	0.003	150	0.004	26	0.003	271	0.002	205	0.009	279	0.002	301

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.088	0.397	5.16	0.0	7.51	12023.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.7 (438.5)	51663. (1079.0)	0.70E 07	-0.018	1.214	12.21	-0.00112	1.201	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.508	5.162	0	0.244	15	0.042	280	0.024	264	0.027	81	0.022	34	0.022	255	0.008	269	0.009	149
CN		0.786	0.337	8	0.115	25	0.044	277	0.018	149	0.008	1	0.004	209	0.002	2	0.005	328	0.002	103
CM		0.001	0.020	309	0.005	147	0.008	0	0.007	248	0.005	140	0.003	27	0.001	255	0.001	148	0.001	312
DCP 1	.010	3.882	2.176	349	0.846	71	0.741	356	0.414	274	0.126	206	0.019	277	0.078	251	0.068	178	0.027	51
DCP 2	.020	3.142	1.832	358	0.505	37	0.261	332	0.204	277	0.206	209	0.141	129	0.032	62	0.050	111	0.071	90
DCP 3	.030	2.937	1.665	358	0.392	22	0.187	298	0.104	224	0.068	180	0.071	129	0.057	62	0.054	9	0.039	321
DCP 4	.049	2.615	1.311	359	0.359	31	0.169	299	0.095	204	0.084	124	0.049	49	0.026	338	0.011	320	0.013	323
DCP 5	.074	2.274	1.025	359	0.293	29	0.140	292	0.082	192	0.058	107	0.042	29	0.027	321	0.016	286	0.013	259
DCP 6	.099	2.002	0.834	1	0.257	32	0.116	294	0.065	189	0.044	95	0.034	10	0.021	289	0.005	240	0.003	15
DCP 7	.149	1.481	0.634	3	0.198	27	0.090	286	0.049	177	0.029	72	0.016	330	0.006	221	0.006	29	0.008	300
DCP 8	.200	1.205	0.536	7	0.168	22	0.084	277	0.049	172	0.024	78	0.008	1	0.006	20	0.013	341	0.012	253
DCP 9	.250	1.051	0.469	7	0.147	13	0.072	253	0.047	133	0.029	23	0.018	268	0.008	174	0.008	336	0.004	155
DCP10	.300	0.918	0.377	8	0.129	15	0.061	253	0.039	130	0.026	15	0.012	263	0.993	237	0.004	284	0.007	125
DCP11	.399	0.749	0.300	16	0.111	19	0.053	251	0.034	126	0.025	6	0.013	257	0.001	40	0.007	317	0.008	150
DCP12	.501	0.552	0.221	21	0.091	19	0.040	243	0.031	106	0.023	342	0.015	218	0.005	69	0.007	315	0.007	134
DCP13	.600	0.435	0.151	34	0.085	25	0.034	248	0.026	98	0.020	331	0.014	208	0.006	56	0.005	309	0.006	117
DCP14	.701	0.385	0.087	61	0.077	30	0.023	241	0.025	73	0.025	314	0.015	187	0.006	55	0.005	310	0.004	93
DCP15	.800	0.201	0.064	57	0.037	19	0.018	186	0.022	55	0.021	303	0.010	184	0.001	351	0.002	345	0.001	18
DCP16	.900	-0.030	0.050	28	0.024	287	0.020	153	0.016	39	0.008	270	0.004	163	0.002	324	0.007	346	0.000	276
DCP17	.969	-0.052	0.015	14	0.020	264	0.010	148	0.008	22	0.004	256	0.003	135	0.001	110	0.009	349	0.001	160

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.088	0.396	5.11	0.9	9.98	12023.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.1 (436.7)	51217. (1069.7)	0.70E 07	-0.079	1.319	13.88	-0.00120	1.281	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.976	5.115	0	0.241	23	0.036	277	0.030	27	0.049	334	0.037	228	0.056	119	0.004	184	0.012	283
CN		0.907	0.229	38	0.143	32	0.019	353	0.027	309	0.016	199	0.007	157	0.016	82	0.008	359	0.006	303
CM		-0.009	0.025	226	0.025	99	0.010	6	0.006	47	0.009	321	0.004	266	0.005	249	0.003	150	0.003	134
DCP 1	.010	4.523	0.732	343	1.281	84	0.393	32	0.187	69	0.122	65	0.148	74	0.148	34	0.092	21	0.049	312
DCP 2	.020	3.588	0.675	19	0.814	69	0.330	38	0.205	4	0.118	359	0.105	326	0.085	346	0.086	320	0.058	280
DCP 3	.030	3.245	0.539	16	0.696	73	0.318	43	0.261	11	0.190	330	0.146	288	0.091	269	0.056	234	0.047	234
DCP 4	.049	2.948	0.512	26	0.635	59	0.232	4	0.118	317	0.062	278	0.040	244	0.012	331	0.029	268	0.046	221
DCP 5	.074	2.495	0.364	38	0.545	56	0.184	355	0.082	315	0.061	289	0.059	241	0.019	184	0.016	195	0.031	178
DCP 6	.099	2.172	0.309	47	0.470	54	0.132	348	0.046	329	0.049	305	0.048	244	0.016	178	0.012	166	0.017	162
DCP 7	.149	1.630	0.316	47	0.347	41	0.073	328	0.043	348	0.052	285	0.037	220	0.014	167	0.017	140	0.016	107
DCP 8	.200	1.352	0.329	45	0.269	34	0.053	320	0.043	337	0.047	264	0.029	203	0.016	137	0.009	91	0.010	127
DCP 9	.250	1.207	0.342	39	0.225	21	0.042	301	0.044	312	0.046	235	0.029	183	0.026	123	0.016	97	0.009	48
DCP10	.300	1.047	0.313	38	0.183	12	0.034	280	0.040	294	0.044	209	0.028	150	0.029	101	0.015	53	0.014	6
DCP11	.399	0.884	0.292	40	0.145	2	0.025	235	0.033	296	0.045	195	0.021	127	0.025	103	0.014	43	0.013	2
DCP12	.501	0.668	0.242	41	0.104	353	0.014	202	0.035	289	0.042	178	0.019	106	0.026	8	0.018	15	0.013	333
DCP13	.600	0.525	0.189	48	0.079	342	0.025	161	0.028	285	0.038	159	0.016	89	0.027	83	0.021	353	0.014	321
DCP14	.701	0.448	0.136	62	0.064	326	0.033	158	0.017	265	0.036	137	0.014	61	0.022	66	0.019	325	0.010	294
DCP15	.800	0.260	0.114	41	0.056	295	0.024	163	0.022	227	0.032	118	0.009	64	0.022	59	0.016	313	0.009	287
DCP16	.900	0.021	0.109	13	0.051	271	0.009	216	0.020	208	0.023	109	0.012	75	0.017	24	0.010	299	0.014	280
DCP17	.969	-0.031	0.057	8	0.031	275	0.006	239	0.013	209	0.009	119	0.005	117	0.007	49	0.005	333	0.002	284

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.086	0.403	5.03	0.0	12.48	12025.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
136.2 (446.9)	53099. (1109.0)	0.71E 07	-0.111	1.362	14.55	-0.00149	1.626	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.482	5.033	0	0.244	18	0.045	155	0.048	57	0.009	108	0.058	12	0.059	315	0.034	265	0.013	187
CN		0.960	0.217	84	0.087	47	0.055	75	0.021	5	0.018	340	0.012	311	0.013	268	0.008	243	0.007	183
CM		-0.026	0.052	204	0.022	104	0.012	158	0.009	96	0.009	106	0.005	61	0.005	52	0.003	19	0.002	358
DCP 1	.010	4.758	0.919	188	0.802	98	0.383	168	0.151	173	0.138	219	0.056	247	0.133	264	0.070	236	0.052	222
DCP 2	.020	3.694	0.515	142	0.557	99	0.257	120	0.167	140	0.156	166	0.105	165	0.108	209	0.087	217	0.080	217
DCP 3	.030	3.316	0.478	163	0.590	114	0.396	117	0.249	108	0.196	102	0.131	90	0.076	101	0.064	105	0.053	112
DCP 4	.049	2.850	0.713	144	0.590	81	0.229	94	0.162	70	0.108	54	0.072	31	0.035	58	0.033	28	0.021	96
DCP 5	.074	2.378	0.701	139	0.471	68	0.170	105	0.150	61	0.068	50	0.060	32	0.040	43	0.039	13	0.020	79
DCP 6	.099	2.106	0.637	132	0.366	57	0.155	115	0.130	46	0.035	46	0.053	17	0.020	18	0.026	357	0.008	100
DCP 7	.149	1.644	0.498	112	0.244	45	0.119	102	0.075	19	0.028	61	0.036	352	0.014	45	0.023	342	0.007	69
DCP 8	.200	1.408	0.358	96	0.177	46	0.108	87	0.054	16	0.042	44	0.034	346	0.019	0	0.020	308	0.005	89
DCP 9	.250	1.286	0.338	81	0.142	37	0.103	73	0.046	19	0.050	24	0.031	348	0.027	348	0.013	330	0.013	323
DCP10	.300	1.137	0.313	70	0.114	25	0.088	57	0.052	341	0.042	344	0.039	303	0.030	291	0.024	262	0.015	252
DCP11	.399	0.961	0.295	62	0.079	15	0.071	54	0.041	336	0.039	342	0.027	306	0.029	299	0.026	268	0.017	242
DCP12	.501	0.760	0.264	54	0.053	352	0.061	36	0.032	311	0.041	320	0.027	272	0.029	271	0.020	219	0.008	198
DCP13	.600	0.621	0.226	53	0.043	321	0.048	32	0.029	295	0.034	310	0.023	256	0.024	247	0.016	201	0.013	167
DCP14	.701	0.511	0.179	53	0.064	288	0.029	15	0.036	260	0.029	279	0.020	227	0.028	227	0.015	159	0.011	183
DCP15	.800	0.321	0.174	37	0.061	291	0.034	333	0.028	254	0.032	273	0.011	221	0.021	222	0.010	190	0.012	178
DCP16	.900	0.068	0.163	17	0.035	302	0.036	321	0.013	290	0.029	263	0.008	179	0.015	199	0.009	182	0.007	117
DCP17	.969	-0.005	0.078	14	0.017	321	0.017	324	0.011	318	0.015	272	0.011	252	0.010	169	0.008	244	0.009	145

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.08	0.087	0.400	5.00	0.0	15.03	12025.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.8 (442.3)	52266. (1091.6)	0.70E 07	-0.115	1.318	15.04	-0.00176	1.903	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.029	4.997	0	0.217	7	0.047	183	0.024	213	0.018	298	0.030	156	0.020	272	0.031	37	0.003	133
CN		0.981	0.235	96	0.057	146	0.012	94	0.038	108	0.003	69	0.007	124	0.012	37	0.010	31	0.003	142
CM		-0.042	0.069	198	0.010	204	0.011	178	0.011	219	0.005	239	0.002	211	0.004	213	0.004	231	0.001	257
DCP 1	.010	4.536	1.723	182	0.248	248	0.162	260	0.114	322	0.078	29	0.091	59	0.073	71	0.038	84	0.055	131
DCP 2	.020	3.616	1.142	163	0.421	162	0.242	235	0.115	274	0.093	3	0.078	66	0.058	61	0.030	116	0.026	123
DCP 3	.030	3.218	1.031	171	0.375	159	0.376	213	0.241	201	0.144	275	0.113	270	0.059	336	0.049	340	0.007	116
DCP 4	.049	2.717	1.109	153	0.324	143	0.232	154	0.153	161	0.042	200	0.043	203	0.014	2	0.032	7	0.009	339
DCP 5	.074	2.273	0.939	144	0.189	165	0.189	147	0.116	169	0.039	214	0.057	209	0.018	298	0.029	321	0.008	324
DCP 6	.099	2.027	0.773	136	0.160	186	0.129	129	0.097	147	0.020	259	0.050	183	0.011	299	0.015	332	0.008	296
DCP 7	.149	1.616	0.537	118	0.148	182	0.071	104	0.085	150	0.034	257	0.031	146	0.005	308	0.021	319	0.001	312
DCP 8	.200	1.412	0.410	106	0.133	166	0.045	107	0.085	142	0.027	220	0.023	149	0.007	69	0.017	313	0.005	1
DCP 9	.250	1.306	0.363	96	0.111	136	0.040	77	0.082	125	0.020	178	0.016	133	0.009	217	0.007	235	0.007	215
DCP10	.300	1.173	0.317	85	0.097	128	0.031	63	0.081	111	0.006	147	0.017	133	0.008	149	0.006	165	0.007	183
DCP11	.399	1.011	0.284	69	0.070	119	0.021	40	0.074	98	0.014	114	0.019	99	0.013	78	0.011	106	0.009	183
DCP12	.501	0.815	0.267	55	0.041	111	0.023	2	0.056	77	.017	100	0.016	78	0.024	67	0.017	69	0.011	98
DCP13	.600	0.667	0.250	47	0.015	126	0.030	356	0.047	62	0.017	67	0.011	36	0.027	45	0.015	52	0.004	120
DCP14	.701	0.551	0.231	40	0.009	299	0.044	351	0.044	42	0.018	50	0.010	5	0.023	32	0.020	43	0.003	14
DCP15	.800	0.379	0.233	27	0.026	24	0.044	348	0.039	28	0.017	43	0.009	342	0.016	26	0.017	39	0.004	95
DCP16	.900	0.127	0.179	18	0.050	40	0.020	16	0.027	16	0.018	32	0.004	57	0.016	354	0.013	18	0.009	70
DCP17	.969	0.018	0.081	18	0.032	41	0.011	49	0.016	17	0.006	19	0.003	108	0.009	350	0.014	40	0.007	12

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.05	0.088	0.397	5.01	0.0	17.46	12025.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.7 (438.8)	51538. (1076.4)	0.70E 07	-0.138	1.274	15.19	-0.00235	2.520	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.465	5.011	0	0.198	2	0.037	251	0.018	339	0.022	355	0.020	100	0.022	287	0.010	248	0.012	331
CN		0.965	0.203	92	0.052	129	0.031	196	0.015	224	0.011	231	0.012	247	0.002	16	0.014	253	0.002	120
CM		-0.064	0.064	206	0.024	238	0.006	283	0.005	328	0.002	20	0.003	30	0.001	96	0.005	46	0.001	197
DCP 1	.010	3.954	1.680	191	0.371	274	0.236	9	0.092	345	0.040	96	0.022	318	0.020	195	0.048	255	0.021	330
DCP 2	.020	3.178	1.415	180	0.187	220	0.197	315	0.082	11	0.091	76	0.012	260	0.028	225	0.026	312	0.018	291
DCP 3	.030	2.812	1.348	171	0.217	264	0.244	244	0.239	335	0.023	8	0.049	35	0.052	161	0.007	205	0.040	213
DCP 4	.049	2.416	1.021	156	0.327	209	0.184	209	0.094	242	0.025	254	0.019	257	0.024	121	0.018	204	0.015	171
DCP 5	.074	2.032	0.744	142	0.318	212	0.098	211	0.078	240	0.022	296	0.007	327	0.024	84	0.005	178	0.015	173
DCP 6	.099	1.831	0.551	129	0.261	205	0.070	229	0.041	231	0.019	267	0.011	337	0.013	63	0.005	235	0.008	145
DCP 7	.149	1.521	0.369	103	0.171	183	0.059	218	0.022	262	0.010	282	0.018	316	0.011	54	0.005	59	0.010	106
DCP 8	.200	1.350	0.302	95	0.140	167	0.065	213	0.037	275	0.021	272	0.027	294	0.016	336	0.012	314	0.002	329
DCP 9	.250	1.261	0.275	85	0.129	136	0.070	200	0.027	230	0.019	234	0.018	265	0.013	31	0.016	331	0.009	188
DCP10	.300	1.164	0.262	78	0.115	115	0.076	192	0.027	219	0.030	234	0.020	245	0.013	356	0.020	285	0.006	131
DCP11	.399	1.030	0.254	66	0.108	97	0.055	184	0.023	205	0.030	230	0.022	239	0.003	12	0.027	301	0.006	130
DCP12	.501	0.856	0.244	53	0.102	80	0.039	165	0.018	205	0.022	220	0.019	244	0.003	290	0.025	271	0.003	109
DCP13	.600	0.717	0.251	48	0.091	74	0.027	144	0.014	188	0.010	216	0.015	233	0.004	329	0.024	257	0.008	64
DCP14	.701	0.606	0.242	39	0.078	63	0.019	102	0.021	156	0.004	187	0.011	225	0.005	290	0.025	222	0.006	6
DCP15	.800	0.455	0.223	35	0.072	56	0.020	77	0.024	140	0.008	193	0.015	205	0.004	201	0.024	206	0.004	44
DCP16	.900	0.194	0.143	40	0.053	47	0.011	74	0.016	139	0.002	134	0.010	191	0.003	227	0.017	189	0.004	288
DCP17	.969	0.048	0.060	52	0.025	48	0.004	52	0.002	169	0.005	206	0.007	165	0.003	235	0.010	202	0.006	280

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.05	0.489	0.395	5.04	0.0	19.94	12025.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.9 (436.0)	50830. (1061.6)	0.69E 07	-0.146	1.169	19.96	-0.00286	3.051	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.940	5.043	0	0.220	7	0.040	248	0.008	266	0.028	24	0.012	85	0.013	209	0.018	53	0.002	2
CN		0.960	0.172	83	0.032	72	0.024	152	0.003	249	0.002	4	0.005	157	0.002	264	0.009	358	0.003	180
CM		-0.087	0.047	229	0.014	230	0.004	316	0.001	225	0.001	83	0.002	261	0.000	323	0.002	177	0.000	321
DCP 1	.010	3.214	1.524	187	0.020	337	0.159	313	0.116	94	0.021	72	0.085	232	0.037	77	0.035	277	0.013	170
DCP 2	.020	2.710	1.122	176	0.087	302	0.074	207	0.086	58	0.045	175	0.052	189	0.022	290	0.024	179	0.007	349
DCP 3	.030	2.463	1.032	160	0.281	261	0.142	109	0.038	222	0.093	85	0.059	171	0.023	27	0.020	200	0.029	324
DCP 4	.049	1.994	0.340	147	0.120	253	0.014	201	0.031	285	0.008	14	0.014	186	0.025	234	0.020	318	0.005	125
DCP 5	.074	1.716	0.217	90	0.055	181	0.019	171	0.026	256	0.015	58	0.020	176	0.015	259	0.013	342	0.008	98
DCP 6	.099	1.625	0.224	64	0.068	139	0.037	150	0.025	264	0.008	329	0.008	144	0.013	228	0.010	34	0.005	152
DCP 7	.149	1.469	0.224	50	0.068	116	0.029	132	0.024	236	0.007	309	0.003	145	0.004	231	0.009	346	0.003	268
DCP 8	.200	1.333	0.180	66	0.065	108	0.034	175	0.027	216	0.017	356	0.017	204	0.002	314	0.001	3	0.009	183
DCP 9	.250	1.282	0.205	81	0.047	120	0.048	188	0.016	236	0.005	265	0.005	51	0.008	189	0.009	41	0.005	175
DCP10	.300	1.197	0.213	82	0.037	98	0.046	165	0.021	238	0.004	244	0.005	249	0.004	280	0.009	36	0.007	194
DCP11	.399	1.092	0.222	81	0.046	76	0.041	159	0.012	288	0.006	344	0.003	252	0.007	258	0.018	3	0.007	238
DCP12	.501	0.925	0.221	73	0.046	65	0.034	127	0.006	141	0.007	334	0.003	80	0.003	291	0.015	8	0.010	183
DCP13	.600	0.776	0.214	63	0.057	54	0.022	142	0.009	73	0.003	158	0.004	143	0.002	231	0.012	3	0.012	168
DCP14	.701	0.674	0.206	55	0.065	46	0.018	142	0.008	31	0.001	246	0.009	95	0.001	99	0.010	346	0.003	108
DCP15	.800	0.522	0.185	50	0.063	41	0.014	153	0.010	13	0.003	186	0.008	103	0.002	48	0.008	8	0.005	38
DCP16	.900	0.237	0.136	64	0.035	47	0.010	109	0.007	74	0.003	252	0.007	109	0.004	164	0.007	324	0.006	346
DCP17	.969	0.064	0.072	76	0.015	55	0.008	101	0.001	170	0.003	331	0.008	97	0.002	100	0.006	332	0.002	149

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.66	0.169	0.406	5.51	0.0	0.02	12027.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
137.2 (450.1)	48752. (1018.2)	0.64E 07	-0.035	0.515	5.47	-0.00067	0.769	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.017	5.513	0	0.273	6	0.106	302	0.013	180	0.010	30	0.021	71	0.025	187	0.023	134	0.002	332
CN		0.122	0.408	357	0.019	26	0.004	37	0.002	257	0.003	227	0.002	83	0.004	218	0.001	359	0.001	282
CM		-0.014	0.018	278	0.002	295	0.001	206	0.002	74	0.000	104	0.000	300	0.001	16	0.001	115	0.000	335
DCP 1	.010	-0.659	2.822	342	0.201	30	0.141	143	0.006	88	0.018	160	0.001	315	0.013	244	0.011	2	0.002	164
DCP 2	.020	-0.317	2.009	348	0.093	350	0.011	30	0.018	63	0.013	162	0.005	28	0.012	238	0.011	333	0.007	285
DCP 3	.030	-0.026	1.695	348	0.075	342	0.009	48	0.011	53	0.007	168	0.004	10	0.012	248	0.001	48	0.004	343
DCP 4	.049	0.178	1.376	348	0.062	345	0.003	73	0.009	68	0.005	224	0.005	51	0.013	238	0.005	230	0.005	269
DCP 5	.074	0.339	1.115	349	0.049	357	0.008	88	0.008	80	0.003	168	0.007	17	0.008	250	0.004	121	0.004	269
DCP 6	.099	0.384	0.955	350	0.044	356	0.005	106	0.005	69	0.004	214	0.005	74	0.011	196	0.003	147	0.005	264
DCP 7	.149	0.252	0.705	351	0.032	7	0.006	117	0.013	104	0.003	184	0.005	75	0.005	154	0.003	177	0.004	254
DCP 8	.200	0.204	0.571	357	0.028	24	0.006	56	0.004	47	0.004	178	0.004	76	0.009	238	0.004	285	0.007	18
DCP 9	.250	0.173	0.576	355	0.025	22	0.009	353	0.003	205	0.004	228	0.005	130	0.005	238	0.006	129	0.003	8
DCP10	.300	0.183	0.486	356	0.022	21	0.006	339	0.004	255	0.005	217	0.001	14	0.002	188	0.007	106	0.001	20
DCP11	.399	0.176	0.393	6	0.023	45	0.009	1	0.010	300	0.004	219	0.001	34	0.005	358	0.008	62	0.003	319
DCP12	.501	0.112	0.302	10	0.018	49	0.003	29	0.005	258	0.006	268	0.005	193	0.005	234	0.004	43	0.004	162
DCP13	.600	0.131	0.229	15	0.013	65	0.006	10	0.006	228	0.004	238	0.001	336	0.005	224	0.003	332	0.002	215
DCP14	.701	0.187	0.161	19	0.012	66	.008	38	0.007	239	0.004	344	0.003	57	0.007	199	0.005	307	0.001	139
DCP15	.800	0.096	0.098	29	0.009	74	0.003	98	0.004	263	0.001	260	0.004	160	0.003	184	0.007	310	0.002	97
DCP16	.900	-0.089	0.029	50	0.007	129	0.008	66	0.008	256	0.001	7	0.003	341	0.008	214	0.009	238	0.002	10
DCP17	.969	-0.038	0.023	174	0.003	213	0.005	298	0.005	259	0.005	199	0.005	76	0.003	214	0.004	102	0.006	219

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.171	0.402	5.52	0.0	2.46	12027.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.6 (444.9)	47871. (999.8)	0.64E 07	-0.033	0.798	7.93	-0.00376	0.849	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.460	5.518 0	0.316 4	0.083 297	0.056 349	0.034 83	0.008 56	0.036 156	0.033 208	0.004 3
CN		0.361	0.443 357	0.022 14	0.007 4	0.012 21	0.001 187	0.004 236	0.004 238	0.003 158	0.000 236
CM		-0.007	0.023 295	0.003 275	0.000 264	0.005 186	0.001 297	0.000 339	0.001 54	0.001 222	0.000 144
DCP 1	.010	1.091	3.023 342	0.158 343	0.018 101	0.016 82	0.019 251	0.009 243	0.008 155	0.018 193	0.002 178
DCP 2	.020	0.931	2.357 348	0.120 341	0.027 344	0.009 105	0.021 289	0.011 216	0.013 186	0.029 168	0.005 172
DCP 3	.030	1.031	2.010 347	0.094 338	0.035 325	0.005 153	0.013 282	0.009 238	0.006 65	0.023 140	0.013 142
DCP 4	.049	1.060	1.652 348	0.075 333	0.017 348	0.018 134	0.007 272	0.009 318	0.008 151	0.002 105	0.003 157
DCP 5	.074	1.053	1.312 348	0.065 349	0.021 10	0.014 146	0.002 210	0.014 0	0.009 264	0.008 78	0.004 152
DCP 6	.099	0.982	1.114 350	0.056 355	0.016 6	0.014 119	0.005 308	0.013 6	0.006 258	0.002 134	0.005 126
DCP 7	.149	0.705	0.826 351	0.042 7	0.009 348	0.015 73	0.005 135	0.003 330	0.003 93	0.004 276	0.002 246
DCP 8	.200	0.979	0.685 357	0.031 11	0.014 1	0.013 124	0.009 243	0.001 353	0.003 136	0.019 222	0.009 258
DCP 9	.250	0.465	0.582 355	0.031 4	0.010 349	0.019 18	0.002 230	0.008 213	0.004 268	0.015 209	0.003 23
DCP10	.300	0.435	0.480 356	0.024 9	0.011 6	0.013 336	0.002 242	0.002 223	0.005 229	0.010 190	0.002 99
DCP11	.399	0.371	0.390 6	0.026 42	0.010 10	0.022 11	0.003 88	0.004 223	0.008 297	0.008 144	0.001 93
DCP12	.501	0.266	0.299 11	0.020 55	0.008 339	0.015 17	0.003 283	0.001 207	0.008 226	0.005 136	0.001 101
DCP13	.600	0.241	0.220 17	0.015 54	0.010 338	0.014 12	0.004 177	0.007 41	0.008 224	0.006 40	0.003 112
DCP14	.701	0.265	0.158 21	0.014 42	0.010 81	0.015 355	0.010 118	0.004 218	0.009 268	0.003 90	0.001 264
DCP15	.800	0.129	0.096 34	0.011 71	0.003 145	0.020 15	0.002 69	0.003 224	0.009 235	0.009 8	0.003 288
DCP16	.900	-0.075	0.036 56	0.008 55	0.006 21	0.019 15	0.003 203	0.001 141	0.007 155	0.006 63	0.007 351
DCP17	.969	-0.052	0.024 165	0.032 238	0.008 187	0.018 7	0.009 91	0.004 91	0.005 259	0.006 228	0.005 235

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.71	0.173	0.400	5.50	0.0	4.98	12027.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.9 (442.5)	47512. (992.3)	0.64E 07	-0.030	0.984	10.41	-0.00377	0.851	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.978	5.498 0	0.272 10	0.089 330	0.031 263	0.024 65	0.022 86	0.021 215	0.013 44	0.006 212
CN		0.608	0.384 0	0.029 25	0.005 329	0.004 219	0.001 217	0.001 140	0.003 264	0.003 242	0.002 235
CM		-0.006	0.022 286	0.003 219	0.001 41	0.002 72	0.000 61	0.000 345	0.000 71	0.002 35	0.000 59
DCP 1	.010	2.029	2.759 343	0.176 296	0.025 160	0.039 206	0.066 137	0.041 52	0.037 22	0.005 346	0.009 284
DCP 2	.020	2.114	1.937 349	0.108 13	0.023 214	0.080 87	0.052 353	0.051 257	0.033 151	0.017 94	0.006 158
DCP 3	.030	2.021	1.622 348	0.110 32	0.037 345	0.036 240	0.018 163	0.008 57	0.026 134	0.012 75	0.003 153
DCP 4	.049	1.893	1.356 349	0.081 29	0.042 343	0.009 180	0.009 185	0.008 93	0.008 63	0.009 95	0.002 275
DCP 5	.074	1.722	1.078 350	0.069 28	0.023 339	0.035 165	0.009 189	0.003 142	0.003 257	0.010 91	0.004 204
DCP 6	.099	1.547	0.902 351	0.063 31	0.015 346	0.013 96	0.004 201	0.002 230	0.003 235	0.005 55	0.005 165
DCP 7	.149	1.130	0.672 353	0.036 28	0.013 352	0.010 84	0.008 188	0.003 104	0.000 214	0.010 1	0.001 28
DCP 8	.200	0.922	0.558 359	0.041 39	0.012 356	0.016 124	0.003 317	0.005 161	0.005 284	0.006 233	0.002 291
DCP 9	.250	0.812	0.559 357	0.037 11	0.004 15	0.007 237	0.001 11	0.000 236	0.004 155	0.013 345	0.003 282
DCP10	.300	0.729	0.466 359	0.033 12	0.007 330	0.009 252	0.004 317	0.004 154	0.003 284	0.006 307	0.003 227
DCP11	.399	0.603	0.367 9	0.032 32	0.003 325	0.007 287	0.009 308	0.002 113	0.003 278	0.011 263	0.006 244
DCP12	.501	0.443	0.284 15	0.021 40	0.006 254	0.008 251	0.003 285	0.001 285	0.010 256	0.006 258	0.002 273
DCP13	.600	0.375	0.208 22	0.025 30	0.004 245	0.006 270	0.003 187	0.003 108	0.007 227	0.005 240	0.006 225
DCP14	.701	0.352	0.138 33	0.027 31	0.005 349	0.005 190	0.001 142	0.003 17	0.006 253	0.011 195	0.001 74
DCP15	.800	0.181	0.086 45	0.017 38	0.002 353	0.005 235	0.002 207	0.003 192	0.001 196	0.011 195	0.002 206
DCP16	.900	-0.059	0.039 62	0.008 357	0.006 237	0.009 239	0.004 124	0.003 162	0.004 65	0.009 191	0.002 128
DCP17	.969	-0.061	0.014 172	0.004 11	0.004 124	0.008 257	0.002 32	0.002 205	0.004 123	0.007 348	0.004 354

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST PULSE	CYCLES ANALYSED
0.0	45.20	0.171	0.399	5.43	0.0	7.46	12027.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	FDR	EXT DAMP
134.2 (440.3)	47224. (986.3)	0.64E 07	-0.031	1.263	12.69	-0.00095	1.369	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.465	5.427	0	0.273	15	0.114	291	0.017	333	0.025	72	0.022	107	0.014	27?	0.011	156	0.007	240
CN		0.775	0.401	16	0.078	339	0.016	178	0.011	137	0.003	208	0.003	191	0.006	54	0.005	298	0.001	160
CM		0.001	0.027	286	0.010	59	0.011	287	0.001	158	0.002	40	0.001	86	0.000	28?	0.001	271	0.001	224
DCP 1	.010	3.542	1.886	354	0.915	48	0.734	325	0.305	227	0.030	29	0.157	225	0.119	11?	0.060	334	0.058	191
DCP 2	.020	2.929	1.668	4	0.586	30	0.364	313	0.214	234	0.117	186	0.104	150	0.085	95	0.062	47	0.049	358
DCP 3	.030	2.844	1.670	2	0.419	7	0.249	284	0.179	196	0.107	117	0.053	68	0.042	2?	0.032	333	0.033	309
DCP 4	.049	2.585	1.441	2	0.311	356	0.139	258	0.083	145	0.034	53	0.008	142	0.035	5?	0.037	305	0.018	249
DCP 5	.074	2.276	1.160	4	0.254	348	0.114	237	0.075	116	0.033	19	0.013	161	0.041	35	0.048	285	0.031	212
DCP 6	.099	1.999	0.972	6	0.220	347	0.094	229	0.060	113	0.020	14	0.007	53	0.032	1?	0.038	268	0.021	190
DCP 7	.149	1.476	0.760	9	0.179	341	0.078	213	0.050	99	0.011	359	0.033	125	0.019	33?	0.019	228	0.013	149
DCP 8	.200	1.212	0.634	15	0.140	337	0.061	200	0.038	78	0.010	299	0.013	64	0.021	32?	0.016	247	0.006	146
DCP 9	.250	1.052	0.588	10	0.104	298	0.068	144	0.037	52	0.018	272	0.006	182	0.003	6?	0.002	13	0.007	151
DCP10	.300	0.920	0.483	12	0.079	299	0.058	130	0.020	29	0.016	191	0.007	20	0.035	21?	0.005	83	0.005	314
DCP11	.399	0.739	0.381	25	0.062	314	0.050	136	0.016	49	0.012	244	0.006	283	0.038	19?	0.003	18	0.001	285
DCP12	.501	0.549	0.303	30	0.048	305	0.040	131	0.008	75	0.008	269	0.007	240	0.012	11?	0.009	310	0.005	198
DCP13	.600	0.432	0.235	45	0.050	323	0.036	130	0.033	49	0.011	213	0.005	224	0.032	13?	0.009	293	0.008	90
DCP14	.701	0.371	0.176	65	0.047	325	0.028	120	0.006	315	0.007	186	0.005	292	0.010	6?	0.004	56	0.008	48
DCP15	.800	0.196	0.128	67	0.023	301	0.030	94	0.009	283	0.008	163	0.032	320	0.009	6?	0.004	161	0.008	41
DCP16	.900	-0.036	0.061	43	0.033	228	0.021	60	0.023	182	0.001	245	0.007	164	0.005	35?	0.004	51	0.003	357
DCP17	.969	-0.058	0.016	35	0.015	236	0.010	91	0.020	183	0.001	348	0.003	157	0.003	24?	0.003	62	0.003	249

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST PULSE	CYCLES ANALYSED
0.0	45.61	0.173	0.398	5.42	0.0	9.80	12027.5	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	FDR	EXT DAMP
133.9 (439.2)	47100. (983.7)	0.64E 07	-0.115	1.438	15.00	-0.00084	0.928	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.797	5.425	0	0.331	25	0.178	304	0.066	103	0.031	69	0.021	85	0.040	22?	0.010	83	0.011	248
CN		0.880	0.409	39	0.129	346	0.030	246	0.016	145	0.012	35	0.005	315	0.008	2??	0.008	242	0.003	69
CM		-0.011	0.039	224	0.035	76	0.017	240	0.012	268	0.008	203	0.003	120	0.003	9?	0.002	10	0.002	228
DCP 1	.010	4.113	1.304	11	1.018	72	0.460	5	0.231	59	0.198	38	0.118	352	0.052	33?	0.053	336	0.039	300
DCP 2	.020	3.258	0.871	32	0.795	63	0.347	9	0.188	347	0.139	325	0.092	249	0.052	23?	0.034	291	0.049	319
DCP 3	.030	2.966	0.757	42	0.620	56	0.407	348	0.160	301	0.088	309	0.099	280	0.087	21?	0.333	210	0.041	249
DCP 4	.049	2.774	0.845	37	0.609	39	0.236	323	0.161	294	0.067	293	0.058	234	0.026	16?	0.037	248	0.037	192
DCP 5	.074	2.415	0.757	42	0.521	30	0.190	307	0.051	290	0.077	264	0.059	191	0.043	4??	0.036	227	0.040	159
DCP 6	.099	2.132	0.714	44	0.449	21	0.160	293	0.043	283	0.071	246	0.055	161	0.019	7?	0.323	226	0.022	136
DCP 7	.149	1.646	0.687	39	0.328	358	0.106	268	0.337	267	0.059	201	0.332	109	0.038	31?	0.026	175	0.023	92
DCP 8	.200	1.363	0.629	42	0.266	354	0.081	266	0.038	253	0.050	186	0.022	99	0.035	14?	0.006	35	0.006	105
DCP 9	.250	1.175	0.593	35	0.233	335	0.368	245	0.363	221	0.347	151	0.324	85	0.037	5?	0.319	46	0.013	342
DCP10	.300	1.046	0.546	34	0.207	322	0.076	220	0.041	181	0.040	110	0.021	42	0.013	1?	0.019	0	0.019	315
DCP11	.399	0.866	0.482	40	0.165	320	0.062	222	0.055	182	0.048	106	0.027	42	0.028	4	0.026	300	0.032	176
DCP12	.501	0.654	0.409	41	0.138	307	0.264	237	0.057	149	0.349	60	0.317	348	0.023	33?	0.024	278	0.002	142
DCP13	.600	0.522	0.342	47	0.123	293	0.060	182	0.049	124	0.044	43	0.321	308	0.018	29?	0.016	250	0.008	84
DCP14	.701	0.442	0.296	52	0.113	278	0.063	153	0.046	98	0.043	18	0.325	294	0.026	26?	0.321	193	0.011	79
DCP15	.800	0.255	0.211	43	0.101	256	0.059	138	0.046	79	0.037	347	0.323	259	0.018	25?	0.016	173	0.013	31
DCP16	.900	0.012	0.130	22	0.082	243	0.031	140	0.041	81	0.034	326	0.009	228	0.015	22?	0.014	154	0.010	46
DCP17	.969	-0.038	0.049	14	0.035	261	0.315	183	0.325	92	0.315	323	0.004	258	0.338	17?	0.310	87	0.008	42

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.170	0.405	5.31	0.0	12.23	12029.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
136.8 (448.7)	48575. (1014.5)	0.64E 07	-0.189	1.631	16.60	-0.00127	1.424	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.204	5.313 0	0.271 21	0.136 46	0.155 205	0.023 187	0.033 64	0.039 292	0.027 120	0.017 255
CN		0.995	0.413 58	0.115 4	0.051 306	0.030 209	0.034 193	0.015 114	0.008 133	0.006 62	0.004 236
CM		-0.033	0.075 210	0.034 109	0.019 87	0.014 17	0.013 347	0.006 257	0.003 276	0.004 214	0.002 148
DCP 1	.010	4.370	0.407 156	0.871 100	0.093 130	0.117 122	0.002 203	0.034 311	0.012 316	0.031 346	0.013 242
DCP 2	.020	3.360	0.565 126	0.598 99	0.155 108	0.099 116	0.048 203	0.052 214	0.038 244	0.020 259	0.014 264
DCP 3	.030	3.087	0.669 18	0.569 79	0.072 114	0.112 114	0.045 152	0.043 179	0.053 166	0.007 242	0.029 227
DCP 4	.049	2.879	0.672 94	0.419 57	0.017 77	0.054 105	0.015 190	0.027 170	0.029 230	0.027 178	0.024 210
DCP 5	.074	2.513	0.659 89	0.355 48	0.028 82	0.062 95	0.022 55	0.015 119	0.012 176	0.007 119	0.017 202
DCP 6	.099	2.261	0.650 81	0.318 38	0.017 9	0.054 98	0.035 80	0.035 78	0.023 66	0.022 37	0.009 295
DCP 7	.149	1.769	0.595 68	0.232 23	0.031 15	0.039 35	0.023 341	0.022 31	0.025 336	0.025 255	0.023 197
DCP 8	.200	1.500	0.562 63	0.160 25	0.053 55	0.043 48	0.035 1	0.023 328	0.015 226	0.011 82	0.016 60
DCP 9	.250	1.337	0.615 59	0.146 14	0.141 349	0.094 298	0.059 248	0.034 217	0.013 254	0.006 237	0.020 210
DCP10	.300	1.178	0.570 55	0.200 7	0.146 342	0.092 277	0.060 239	0.041 201	0.035 178	0.013 215	0.023 177
DCP11	.399	1.012	0.546 55	0.168 358	0.124 338	0.076 273	0.076 245	0.039 181	0.012 227	0.019 179	0.019 182
DCP12	.501	0.793	0.490 49	0.138 338	0.097 308	0.070 241	0.084 212	0.043 143	0.021 166	0.029 115	0.008 72
DCP13	.600	0.656	0.436 47	0.132 315	0.083 284	0.070 215	0.082 190	0.045 104	0.024 164	0.032 75	0.013 12
DCP14	.701	0.544	0.368 45	0.136 293	0.087 257	0.081 185	0.074 166	0.045 71	0.019 122	0.033 45	0.019 322
DCP15	.800	0.360	0.312 33	0.133 282	0.096 247	0.081 168	0.066 138	0.034 92	0.022 79	0.028 347	0.013 294
DCP16	.900	0.068	0.208 21	0.080 290	0.086 239	0.051 161	0.045 110	0.021 21	0.014 64	0.015 325	0.008 300
DCP17	.969	-0.012	0.090 18	0.038 306	0.031 241	0.025 145	0.014 124	0.015 37	0.005 355	0.006 16	0.004 324

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	44.95	0.169	0.401	5.18	0.0	14.98	12029.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
135.4 (444.1)	47756. (997.4)	0.64E 07	-0.202	1.613	17.73	-0.00175	1.940	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.977	5.178 0	0.149 25	0.114 66	0.125 212	0.029 297	0.017 65	0.037 194	0.014 115	0.013 224
CN		1.035	0.429 76	0.102 60	0.042 30	0.024 243	0.011 289	0.019 255	0.037 216	0.003 214	0.004 83
CM		-0.045	0.091 210	0.025 168	0.024 131	0.016 77	0.003 99	0.006 54	0.002 349	0.002 30	0.002 299
DCP 1	.010	4.296	1.822 179	0.711 136	0.152 160	0.084 195	0.038 226	0.105 6	0.064 55	0.042 68	0.061 64
DCP 2	.020	3.304	1.185 160	0.617 136	0.313 167	0.249 201	0.112 222	0.098 304	0.023 293	0.046 41	0.031 118
DCP 3	.030	3.057	1.236 149	0.439 115	0.342 164	0.180 159	0.162 225	0.079 229	0.077 256	0.031 265	0.019 331
DCP 4	.049	2.887	1.037 127	0.330 90	0.212 133	0.111 142	0.036 195	0.044 220	0.009 243	0.025 258	0.005 29
DCP 5	.074	2.532	0.928 116	0.212 87	0.240 122	0.375 131	0.047 163	0.038 206	0.031 176	0.014 263	0.004 297
DCP 6	.099	2.271	0.847 106	0.164 84	0.225 111	0.363 116	0.018 112	0.026 195	0.015 240	0.033 233	0.016 281
DCP 7	.149	1.835	0.714 86	0.134 90	0.204 85	0.072 71	0.038 9	0.018 117	0.033 240	0.013 165	0.007 99
DCP 8	.200	1.558	0.653 84	0.188 95	0.191 73	0.064 77	0.041 16	0.019 75	0.035 15	0.023 168	0.015 97
DCP 9	.250	1.359	0.620 76	0.180 71	0.139 33	0.018 348	0.027 326	0.016 315	0.037 344	0.015 197	0.016 68
DCP10	.300	1.223	0.574 70	0.186 62	0.125 19	0.026 355	0.029 324	0.016 324	0.014 346	0.008 121	0.016 26
DCP11	.399	1.053	0.562 67	0.155 56	0.109 20	0.041 318	0.023 340	0.031 314	0.018 29	0.010 307	0.009 334
DCP12	.501	0.844	0.514 58	0.119 36	0.092 354	0.052 293	0.017 314	0.034 273	0.020 226	0.005 221	0.012 289
DCP13	.600	0.708	0.474 53	0.097 18	0.085 329	0.065 276	0.014 283	0.034 259	0.017 19	0.011 244	0.012 212
DCP14	.701	0.589	0.405 47	0.083 352	0.103 304	0.073 251	0.019 244	0.025 233	0.015 166	0.013 228	0.017 127
DCP15	.800	0.410	0.345 36	0.096 346	0.094 293	0.076 235	0.013 216	0.018 205	0.009 166	0.020 205	0.020 95
DCP16	.900	0.123	0.229 24	0.078 350	0.069 276	0.061 223	0.011 279	0.019 181	0.013 113	0.007 173	0.011 88
DCP17	.969	0.012	0.106 33	0.051 352	0.020 307	0.041 240	0.011 224	0.015 215	0.005 139	0.003 115	0.004 175

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.64	0.172	0.400	5.30	0.0	17.47	12029.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.9 (442.5)	47521. (992.5)	0.64E 07	-0.242	1.758	18.48	-0.00225	2.63e	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.466	5.300	0	0.159	358	0.127	167	0.081	347	0.068	23	0.014	50	0.031	22?	0.007	244	0.001	100
CN		1.051	0.433	77	0.105	73	0.082	87	0.023	52	0.050	37	0.011	22	0.012	[illegible]	0.009	101	0.002	18
CM		-0.061	0.132	215	0.043	234	0.027	212	0.014	191	0.014	189	0.002	181	0.005	147	0.003	251	0.001	157
DCP 1	.010	3.832	2.249	185	0.236	207	0.114	224	0.074	219	0.125	71	0.031	146	0.003	146	0.024	202	0.007	200
DCP 2	.020	3.076	1.532	171	0.156	193	0.116	236	0.086	289	0.114	358	0.021	78	0.003	123	0.025	245	0.007	220
DCP 3	.030	2.851	1.392	157	0.112	197	0.162	195	0.199	277	0.075	307	0.117	350	0.035	[illegible]	0.031	21	0.016	115
DCP 4	.049	2.855	0.993	130	0.162	200	0.268	175	0.136	254	0.042	234	0.032	354	0.035	66	0.025	123	0.033	97
DCP 5	.074	2.547	0.868	119	0.165	189	0.211	152	0.135	203	0.020	265	0.060	338	0.036	[illegible]	0.013	43	0.012	85
DCP 6	.099	2.265	0.781	102	0.171	187	0.167	147	0.073	192	0.015	24	0.010	252	0.023	55	0.011	67	0.016	152
DCP 7	.149	1.814	0.673	86	0.248	145	0.151	137	0.057	143	0.037	97	0.013	3	0.015	[illegible]	0.010	73	0.026	311
DCP 8	.200	1.513	0.607	90	0.269	128	0.121	115	0.060	147	0.046	79	0.013	232	0.015	[illegible]	0.014	321	0.004	312
DCP 9	.250	1.362	0.612	78	0.249	104	0.139	104	0.081	107	0.063	75	0.005	348	0.012	[illegible]	0.018	269	0.011	326
DCP10	.300	1.222	0.572	72	0.222	90	0.154	99	0.083	97	0.083	72	0.011	93	0.011	[illegible]	0.018	194	0.024	243
DCP11	.399	1.085	0.557	61	0.206	73	0.150	93	0.077	84	0.100	77	0.030	92	0.031	[illegible]	0.031	170	0.011	107
DCP12	.501	0.897	0.529	59	0.201	56	0.135	79	0.066	64	0.099	55	0.027	85	0.035	[illegible]	0.034	138	0.013	86
DCP13	.600	0.748	0.506	53	0.189	40	0.125	56	0.067	38	0.097	33	0.031	33	0.029	16	0.033	102	0.014	32
DCP14	.701	0.628	0.470	45	0.177	23	0.121	32	0.079	0	0.085	358	0.017	335	0.033	[illegible]	0.031	53	0.009	327
DCP15	.800	0.474	0.395	41	0.167	13	0.113	16	0.071	338	0.068	337	0.018	322	0.032	[illegible]	0.017	23	0.006	273
DCP16	.900	0.187	0.246	41	0.106	1	0.066	12	0.044	333	0.042	334	0.014	302	0.028	[illegible]	0.021	5	0.008	242
DCP17	.969	0.042	0.11	48	0.053	0	0.024	13	0.019	316	0.019	322	0.009	241	0.005	[illegible]	0.000	271	0.007	51

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.54	0.173	0.399	5.32	0.0	19.87	12029.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.3 (440.5)	47229. (986.4)	0.64E 07	-0.203	1.694	19.83	0.00272	2.99>	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.871	5.322	0	0.204	357	0.080	226	0.007	341	0.029	48	0.015	77	0.019	[illegible]	0.014	161	0.004	61
CN		1.039	0.368	79	0.053	111	0.037	87	0.007	184	0.006	212	0.009	55	0.001	[illegible]	0.001	263	0.003	134
CM		-0.085	0.091	231	0.022	232	0.016	245	0.002	0	0.002	31	0.003	206	0.002	[illegible]	0.001	93	0.002	301
DCP 1	.010	3.338	1.700	187	0.429	308	0.099	0	0.182	88	0.074	177	0.048	161	0.067	[illegible]	0.023	254	0.013	333
DCP 2	.020	2.863	1.056	170	0.244	288	0.071	311	0.163	48	0.074	165	0.026	111	0.003	[illegible]	0.014	348	0.026	332
DCP 3	.030	2.572	1.002	156	0.351	258	0.038	305	0.118	322	0.088	43	0.029	119	0.042	[illegible]	0.035	157	0.005	137
DCP 4	.049	2.427	0.726	143	0.284	214	0.058	272	0.032	304	0.010	286	0.000	281	0.038	[illegible]	0.022	316	0.013	36
DCP 5	.074	2.139	0.535	117	0.288	196	0.044	280	0.020	273	0.010	195	0.011	236	0.013	[illegible]	0.022	262	0.015	350
DCP 6	.099	1.962	0.495	97	0.261	185	0.055	254	0.011	223	0.005	2	0.038	198	0.013	[illegible]	0.011	165	0.013	336
DCP 7	.149	1.678	0.451	77	0.192	146	0.033	194	0.012	161	0.008	68	0.013	127	0.018	[illegible]	0.011	177	0.003	264
DCP 8	.200	1.484	0.454	79	0.140	134	0.046	163	0.008	82	0.007	310	0.008	80	0.013	[illegible]	0.014	157	0.001	120
DCP 9	.250	1.359	0.445	77	0.126	119	0.058	146	0.019	218	0.012	269	0.022	66	0.032	[illegible]	0.037	151	0.009	197
DCP10	.300	1.245	0.425	74	0.114	103	0.067	128	0.027	216	0.004	217	0.017	39	0.012	[illegible]	0.008	76	0.002	106
DCP11	.399	1.133	0.461	75	0.101	99	0.068	113	0.036	212	0.010	351	0.017	64	0.017	[illegible]	0.019	89	0.006	219
DCP12	.501	0.957	0.462	69	0.092	87	0.075	94	0.031	172	0.017	223	0.014	62	0.011	[illegible]	0.025	27	0.007	186
DCP13	.600	0.811	0.453	63	0.091	69	0.074	79	0.018	170	0.014	242	0.008	74	0.021	[illegible]	0.013	328	0.009	157
DCP14	.701	0.696	0.432	58	0.094	49	0.076	59	0.014	99	0.015	186	0.014	53	0.016	[illegible]	0.019	277	0.013	119
DCP15	.803	0.545	0.372	56	0.077	34	0.065	45	0.007	12	0.015	203	0.013	50	0.019	[illegible]	0.011	246	0.012	90
DCP16	.900	0.240	0.249	57	0.044	36	0.044	35	0.004	29	0.009	134	0.016	325	0.007	[illegible]	0.010	189	0.005	54
DCP17	.969	0.068	0.122	65	0.022	40	0.021	30	0.012	281	0.011	241	0.013	2	0.002	[illegible]	0.013	202	0.004	253

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	49.63	0.185	0.404	5.59	0.0	5.83	12079.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.2 (446.9)	48924. (1021.8)	0.65E 07	-0.024	1.077	11.36	-0.00083	0.935	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.834	5.591	0	0.303	5	0.107	323	0.038	204	0.023	73	0.026	80	0.015	239	0.006	298	0.009	134
CN		0.711	0.475	353	0.035	17	0.008	104	0.006	287	0.002	91	0.005	224	0.001	160	0.003	340	0.004	181
CM		0.006	0.026	252	0.002	251	0.001	48	0.001	268	0.001	49	0.001	39	0.000	247	0.001	306	0.001	182
DCP 1	.010	3.071	2.812	342	0.161	232	0.056	120	0.056	243	0.062	134	0.057	69	0.022	323	0.032	322	0.007	349
DCP 2	.020	2.652	1.893	341	0.134	5	0.034	122	0.013	30	0.043	359	0.043	248	0.038	154	0.027	24	0.016	105
DCP 3	.030	2.549	1.616	345	0.134	17	0.027	73	0.033	269	0.014	57	0.006	65	0.010	178	0.020	343	0.017	96
DCP 4	.049	2.401	1.362	344	0.133	14	0.025	66	0.044	267	0.016	48	0.001	195	0.011	192	0.017	339	0.018	109
DCP 5	.074	2.167	1.059	343	0.120	12	0.028	116	0.038	269	0.018	29	0.008	195	0.010	213	0.021	325	0.019	112
DCP 6	.099	2.072	0.870	344	0.103	15	0.034	113	0.036	266	0.014	44	0.005	233	0.009	223	0.015	338	0.024	115
DCP 7	.149	1.566	0.652	350	0.058	7	0.022	108	0.019	283	0.007	52	0.007	329	0.009	130	0.015	279	0.023	70
DCP 8	.200	1.339	0.524	357	0.066	5	0.037	119	0.035	284	0.024	55	0.007	238	0.010	227	0.006	346	0.021	111
DCP 9	.250	0.823	0.349	358	0.040	16	0.011	348	0.005	353	0.002	276	0.005	210	0.002	315	0.003	281	0.002	278
DCP10	.300	0.711	0.458	0	0.034	20	0.009	1	0.003	0	0.006	227	0.004	237	0.004	46	0.001	101	0.001	77
DCP11	.369	0.593	0.367	11	0.034	28	0.005	49	0.003	7	0.005	226	0.011	223	0.003	95	0.000	54	0.004	323
DCP12	.501	0.459	0.283	16	0.024	36	0.004	102	0.006	46	0.004	242	0.007	232	0.003	307	0.002	108	0.003	166
DCP13	.600	0.394	0.218	22	0.023	47	0.006	94	0.008	41	0.002	132	0.005	204	0.004	34	0.003	82	0.001	257
DCP14	.701	0.373	0.160	35	0.025	37	0.003	130	0.004	114	0.001	129	0.007	212	0.001	8	0.005	89	0.002	224
DCP15	.800	0.191	0.094	49	0.012	28	0.007	137	0.002	139	0.003	243	0.004	233	0.003	146	0.002	53	0.003	326
DCP16	.900	-0.057	0.041	63	0.006	5	0.004	269	0.002	161	0.003	292	0.008	217	0.003	159	0.005	240	0.003	205
DCP17	.969	-0.059	0.024	165	0.006	306	0.008	191	0.003	188	0.005	186	0.004	52	0.003	76	0.004	0	0.005	27

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	44.70	0.187	0.402	5.57	0.0	7.51	12079.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.1 (443.2)	47923. (1000.9)	0.64E 07	-0.033	1.273	12.92	-0.00096	1.071	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.512	5.570	0	0.336	8	0.100	295	0.071	257	0.041	80	0.022	44	0.029	178	0.007	288	0.009	122
CN		0.773	0.423	18	0.083	330	0.021	147	0.012	328	0.007	166	0.003	66	0.003	355	0.002	295	0.001	199
CM		-0.002	0.030	282	0.011	52	0.013	271	0.008	136	0.007	336	0.001	113	0.001	315	0.001	234	0.001	104
DCP 1	.010	3.486	2.102	353	0.753	45	0.678	327	0.345	235	0.027	89	0.142	276	0.112	129	0.047	18	0.034	160
DCP 2	.020	2.961	1.875	2	0.479	21	0.284	310	0.188	236	0.133	185	0.106	135	0.062	90	0.079	65	0.072	13
DCP 3	.030	2.827	1.717	1	0.387	8	0.236	295	0.187	208	0.130	135	0.089	76	0.076	12	0.042	318	0.036	300
DCP 4	.049	2.678	1.344	5	0.378	8	0.191	276	0.098	169	0.022	85	0.040	130	0.073	41	0.077	318	0.047	231
DCP 5	.074	2.157	1.135	7	0.312	357	0.161	244	0.108	131	0.045	92	0.012	66	0.042	357	0.046	270	0.031	181
DCP 6	.099	1.894	0.995		0.265	341	0.137	219	0.090	110	0.033	3	0.017	73	0.049	329	0.046	233	0.029	133
DCP 7	.149	1.495	0.7		205	318	0.119	180	0.073	68	0.019	295	0.023	58	0.047	302	0.043	200	0.029	105
DCP 8	.200	1.209	0.		(	316	0.085	169	0.049	54	0.008	252	0.026	33	0.042	276	0.029	160	0.017	47
DCP 9	.250	1.062	0.			299	0.041	146	0.045	20	0.009	267	0.022	316	0.036	204	0.029	97	0.019	354
DCP10	.300		0.			298	0.070	132	0.041	1	0.016	232	0.037	270	0.016	169	0.015	42	0.026	259
DCP11	.395		0.			305	0.065	127	0.039	351	0.014	213	0.006	317	0.015	147	0.015	48	0.009	269
DCP12	.501				43	305	0.051	116	0.041	332	0.012	217	0.004	293	0.010	99	0.009	354	0.007	192
DCP13	.600		.062	45	0.079	312	0.044	101	0.038	315	0.019	166	0.005	69	0.004	84	0.006	292	0.001	355
DCP14	.701		.198	64	0.045	321	0.043	84	0.036	300	0.019	137	0.032	173	0.005	62	0.009	282	0.003	176
DCP15	.800			66	0.025	273	0.041	81	0.027	293	0.011	120	0.004	232	0.006	353	0.003	245	0.005	27
DCP16	.900	-0.		69	0.042	273	0.025	59	0.015	245	0.008	123	0.004	57	0.002	339	0.006	116	0.007	261
DCP17	.969	-0.		71	0.021	231	0.019	37	0.007	254	0.001	357	0.003	149	0.003	19	0.004	99	0.004	284

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	49.71	0.189	0.398	5.51	0.0	10.02	12079.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
133.6 (438.4)	47105. (983.8)	0.64E 07	-0.130	1.520	15.43	-0.00071	0.781	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		10.023	5.507 0	0.376 19	0.165 324	0.014 230	0.035 69	0.022 28	0.022 182	0.019 316	0.006 172
CN		0.908	0.479 96	0.116 328	0.026 299	0.031 98	0.020 335	0.009 275	0.010 302	0.011 220	0.009 114
CM		-0.019	0.046 213	0.041 60	0.019	0.019 268	0.008 160	0.002 129	0.003 76	0.004 331	0.004 246
PCP 1	.010	3.894	1.928 10	1.015 76	0.521 19	0.204 35	0.265 1	0.144 310	0.022 306	0.099 334	0.046 297
PCP 2	.020	3.325	1.108 29	0.729 54	.250 5	0.160 25	0.206 349	0.181 337	0.117 258	0.065 242	0.047 276
PCP 3	.030	2.934	0.796 47	0.923 56	0.487 348	0.181 300	0.114 304	0.141 271	0.179 214	0.049 165	0.034 217
PCP 4	.049	2.781	0.944 38	0.619 33	0.219 310	0.013 17	0.074 296	0.053 213	0.012 11	0.064 256	0.089 186
PCP 5	.074	2.397	0.877 41	0.538 21	0.181 295	0.392 314	0.090 253	0.065 166	0.015 8	0.058 223	0.061 140
PCP 6	.099	2.146	0.814 43	0.462 13	0.163 286	0.036 324	0.082 241	0.053 155	0.021 306	0.054 203	0.058 117
PCP 7	.149	1.662	0.769 39	0.337 351	0.089 259	0.047 296	0.040 208	0.041 119	0.013 225	0.032 126	0.039 39
PCP 8	.200	1.378	0.722 40	0.282 344	0.095 260	0.037 221	0.039 166	0.011 65	0.019 160	0.016 88	0.020 33
PCP 9	.250	1.218	0.689 36	0.261 323	0.073 223	0.046 203	0.053 141	0.034 69	0.021 78	0.028 346	0.029 304
PCP10	.300	1.087	0.645 33	0.237 307	0.086 204	0.053 158	0.041 94	0.019 34	0.017 [illegible]	0.033 316	0.029 268
PCP11	.399	0.933	0.587 34	0.199 292	0.074 193	0.069 151	0.049 83	[illegible]012 88	0.045 [illegible] 9	0.054 304	0.036 217
PCP12	.501	.714	0.490 36	0.165 281	0.071 181	0.080 128	0.049 31	0.008 15	0.037 [illegible]	0.038 253	0.035 163
PCP13	.600	0.562	0.389 40	0.136 265	0.073 196	0.084 102	0.064 [illegible]	0.016 311	0.033 [illegible]	0.038 207	0.035 120
PCP14	.701	0.471	0.296 46	0.123 246	0.074 126	0.066 76	0.056 [illegible]	0.016 269	0.030 [illegible]	0.033 157	0.034 74
PCP15	.800	0.281	0.224 33	0.118 230	0.055 126	0.062 64	0.049 [illegible]	0.013 241	0.029 [illegible]	0.033 138	0.030 42
PCP16	.900	0.025	0.153 11	0.085 228	0.049 144	0.058 52	0.032 [illegible]	0.009 253	0.011 [illegible]	0.025 106	0.023 9
PCP17	.969	-0.042	0.052 12	0.029 248	0.022 177	0.031 51	0.019 [illegible]	0.009 [illegible]	0.021 [illegible]	0.013 87	0.007 86

FORCED PITCHING OSCILLATION AIRFOIL NLR .

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	49.69	0.191	0.394	5.44	0.0	12.52	12079.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
132.3 (434.1)	46339. (967.8)	0.63E 07	-0.222	1.786	17.37	-0.00089	0.963	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.523	5.419 0	0.365 29	0.267 356	0.078 158	0.038 150	0.031 27	0.017 215	0.039 327	0.008 219
CN		1.039	0.492 51	0.123 348	0.093 309	0.052 239	0.032 176	0.026 106	0.016 43	0.013 9	0.006 335
CM		-0.036	0.085 203	0.043 95	0.026 62	0.018 351	0.012 323	0.010 258	0.006 196	0.004 182	0.003 104
PCP 1	.010	4.363	2.350 129	1.139 97	0.285 101	0.190 79	0.091 130	0.067 114	0.039 101	0.040 196	0.039 103
PCP 2	.020	3.645	1.673 88	0.752 82	0.226 76	0.118 77	0.148 92	0.107 71	0.078 68	0.045 90	0.050 91
PCP 3	.030	3.168	0.697 117	0.914 82	0.264 47	0.165 65	0.159 47	0.087 24	0.044 39	0.086 [illegible]	0.061 395
PCP 4	.049	2.978	0.804 89	0.608 55	0.096 44	0.124 31	0.029 355	0.035 63	0.058 19	0.026 329	0.036 31
PCP 5	.074	2.594	0.811 81	0.473 41	0.101 53	0.138 2	0.021 298	0.078 39	0.073 346	0.009 341	0.038 23
PCP 6	.099	2.296	0.792 76	0.375 34	0.141 54	0.152 342	0.020 222	0.033 28	0.044 347	0.048 294	0.021 303
PCP 7	.149	1.847	0.779 60	0.273 13	0.134 26	0.125 310	0.019 247	0.029 [illegible]	0.010 249	0.017 314	0.019 [illegible]
PCP 8	.200	1.558	0.745 58	0.244 14	0.131 7	0.118 302	0.039 243	0.022 219	0.034 308	0.017 313	0.021 244
PCP 9	.250	1.376	0.715 52	0.233 6	0.104 342	0.120 271	0.046 [illegible]	0.027 227	0.042 274	0.016 156	0.011 215
PCP10	.300	1.221	0.655 47	0.199 357	0.163 330	0.107 255	0.058 226	0.043 197	0.037 173	0.015 122	0.025 191
PCP11	.399	1.053	0.592 47	0.159 347	0.147 322	0.094 247	0.073 239	0.073 185	0.041 149	0.029 111	0.022 115
PCP12	.501	0.839	0.568 42	0.149 324	0.125 294	0.086 219	0.080 207	0.085 145	0.052 89	0.030 [illegible]	0.032 48
PCP13	.600	0.683	0.519 41	0.153 301	0.111 261	0.073 189	0.077 176	0.083 110	0.058 55	0.041 33	0.033 352
PCP14	.701	0.583	0.428 37	0.170 276	0.109 228	0.095 153	0.073 135	0.079 73	0.059 6	0.032 7	0.037 297
PCP15	.800	0.379	0.366 26	0.165 270	0.113 221	0.082 145	0.070 114	0.062 39	0.036 347	0.028 328	0.024 271
PCP16	.900	0.078	0.225 15	0.096 272	0.077 212	0.059 134	0.053 99	0.038 16	0.031 334	0.027 293	0.019 215
PCP17	.969	-0.021	0.093 15	0.043 295	0.041 226	0.024 143	0.024 108	0.024 28	0.012 294	0.008 297	0.005 204

FORCED PITCHING OSCILLATION — AIRFOIL NLF 1

TUNNEL MZ	PRIME MZ	K	MACH NO	REL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYZED
0.0	49.06	0.192	0.303	5.36	0.0	15.10	12879.5	20

V	Q	RE	CM(MIN)	ALPHA,MAX	AERO DAMP	TSR	EXT AMP
132.2 (433.1)	46228. (965.5)	0.63E 07	-0.270	1.969 18.50	-0.0E147	1.908	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		15.098	5.361 0	0.241 21	0.238 42	0.007 230	0.020 296	0.011 134	0.007 282	0.036 87	0.000 298
CN		1.105	0.535 61	0.083 43	0.079 25	0.009 311	0.039 237	0.015 241	0.012 226	0.011 177	0.006 107
CM		-0.058	0.110 203	0.054 137	0.020 119	0.020 89	0.012 21	0.006	0.006 22	0.007 350	0.005 284
PCO 1	.010	4.068	1.146 167	0.790 125	0.288 170	0.075 217	0.009 210	0.017 171	0.016 94	0.033 10	0.008 348
PCO 2	.020	3.589	1.041 142	0.608 116	0.296 143	0.147 188	0.140 224	0.115 217	0.063 274	0.046 278	0.733 343
PCO 3	.030	3.152	1.201 143	0.563 100	0.304 142	0.190 115	0.115 147	0.133 164	0.042 203	0.047 185	0.025 297
PCO 4	.040	2.695	1.042 115	0.377 86	0.270 119	0.076 91	0.066 100	0.0 130	0.[illegible] 204	0.027 196	0.001 213
PCO 5	.050	2.585	0.987 109	0.205 78	0.257 100	0.046 71	0.053 116	0.028 165	0.[illegible] 156	0.030 148	0.322 157
PCO 6	.074	2.515	0.981 96	0.164 92	0.287 88	0.044 49	0.028 71	0.045 147	0.040 87	0.013 71	0.009 187
PCO 7	.149	2.017	0.931 77	0.196 60	0.205 61	0.049 18	0.045 12	0.020 99	0.030 44	0.019 19	0.314 185
PCO 8	.200	1.827	0.763 72	0.180 70	0.234 54	0.042 25	0.031 356	0.045 91	0.023 50	0.026 [illegible]	0.017 33
PCO 9	.250	1.464	0.751 64	0.180 68	0.251 76	0.136 2	0.067 312	0.026 47	0.014 4	0.024 19	0.010 71
PCO10	.300	1.308	0.704 58	0.171 62	0.210 24	0.140 349	0.017 297	0.021 345	0.022 312	0.026 24	0.009 343
PCO11	.349	1.144	0.706 55	0.124 50	0.180 28	0.164 352	0.085 301	0.048 322	0.045 304	0.021 329	0.038 297
PCO12	.501	0.940	0.664 46	0.[illegible] 10	0.141 0	0.169 325	0.086 276	0.074 277	0.095 265	0.049 251	0.055 226
PCO13	.600	0.778	0.[illegible] 42	0.[illegible] 342	0.123 324	0.151 296	0.078 232	0.065 263	0.041 227	0.051 215	0.059 181
PCO14	.701	0.670	0.560 35	0.127 315	0.[illegible] 291	0.155 263	0.089 191	0.049 202	0.041 185	0.054 160	0.053 107
PCO15	.800	0.465	0.477 27	0.159 316	0.132 274	0.147 244	0.092 175	0.038 162	0.033 157	0.037 [illegible]	0.036 76
PCO16	.900	0.159	0.396 17	0.[illegible] 316	0.067 269	0.092 229	0.043 151	0.021 106	0.030 142	0.036 [illegible]	0.033 43
PCO17	.969	0.111	0.125 25	0.055 320	0.039 251	0.040 212	0.021 138	0.006 133	0.011 140	0.008 136	0.015 96

FORCED PITCHING OSCILLATION — AIRFOIL NLF 1

TUNNEL MZ	PRIME MZ	K	MACH NO	REL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYZED
0.0	51.60	0.188	0.413	5.64	0.0	4.96	12881.1	20

V	Q	RE	CM(MIN)	ALPHA,MAX	AERO DAMP	TSR	EXT AMP
139.6 (458.1)	50456. (1053.6)	0.84E 07	-0.359	0.976 10.95	-0.00082	0.937	0.3

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.980	5.640 0	0.326 3	0.165 4	0.038 229	0.030 81	0.016 68	0.039 274	0.017 297	0.012 132
CN		0.984	0.411 1	0.028 17	0.013 37	0.004 359	0.001 236	0.002 [illegible]	0.003 344	0.002 358	0.001 80
CM		-0.006	0.029 296	0.001 246	0.003 [illegible]	0.001 215	0.000 125	0.001 [illegible]	0.001 205	0.001 [illegible]	0.000 257
PCO 1	.010	2.449	3.138 342	0.255 270	0.[illegible] 62	0.347 197	0.371 103	0.[illegible] 0	0.[illegible] 282	0.[illegible] 295	0.016 197
PCO 2	.020	2.024	2.862 349	0.[illegible] 9	0.[illegible] 5	0.[illegible] 45	0.051 209	0.057 [illegible]	0.[illegible] 119	0.[illegible] 337	0.006 182
PCO 3	.030	1.663	1.877 348	0.112 10	0.[illegible] 350	0.027 240	0.015 139	0.004 142	0.[illegible] 229	0.[illegible] [illegible]	0.001 304
PCO 4	.040	1.649	1.577 349	0.[illegible] 0	0.[illegible] 345	0.016 252	0.008 164	0.[illegible] 210	0.[illegible] 247	0.[illegible] 312	0.004 173
PCO 5	.074	1.418	1.211 350	0.068 4	0.[illegible] 346	0.[illegible] 271	0.006 218	0.[illegible] 241	0.[illegible] 247	0.[illegible] 328	0.004 141
PCO 6	.149	1.041	1.039 352	0.046 [illegible]	0.[illegible] 4	0.000 314	0.[illegible] 210	0.004 151	0.[illegible] 313	0.[illegible] 333	0.[illegible] 116
PCO 7	.200	1.006	0.775 353	0.046 [illegible]	0.028 3	0.000 312	0.[illegible] 247	0.004 205	0.[illegible] 275	0.[illegible] 316	0.004 351
PCO 8	.250	0.887	0.[illegible] 0	0.045 24	0.[illegible] 18	0.[illegible] 329	0.004 244	0.[illegible] 142	0.[illegible] 284	0.[illegible] 304	0.[illegible] 232
PCO 9	.300	0.781	0.534 359	0.[illegible] 14	0.[illegible] 47	0.[illegible] 347	0.001 128	0.[illegible] 183	0.[illegible] 270	0.[illegible] 351	0.[illegible] 79
PCO10	.349	0.682	0.[illegible] 1	0.033 [illegible]	0.[illegible] 36	0.[illegible] 330	0.[illegible] 245	0.[illegible] 147	0.[illegible] 250	0.[illegible] 17	0.[illegible] 281
PCO11	.501	0.546	0.357 15	0.027 [illegible]	0.[illegible] 28	0.[illegible] 31	0.[illegible] 265	0.[illegible] 335	0.[illegible] 4	0.[illegible] 53	0.[illegible] 351
PCO12	.600	0.436	0.279 18	0.[illegible] [illegible]	0.[illegible] 91	0.[illegible] 24	0.[illegible] 11	0.[illegible] 277	0.[illegible] 23	0.[illegible] 20	0.[illegible] 44
PCO13	.700	0.367	0.212 37	0.025 45	0.[illegible] 92	0.[illegible] 50	0.[illegible] 254	0.[illegible] 264	0.[illegible] 74	0.[illegible] 150	0.[illegible] 89
PCO14	.701	0.353	0.163 31	0.021 41	0.[illegible] 91	0.[illegible] 40	0.[illegible] 178	0.[illegible] 147	0.[illegible] 342	0.[illegible] 328	0.[illegible] 205
PCO15	.800	0.176	0.[illegible] 51	0.[illegible] 44	0.[illegible] 98	0.[illegible] 46	0.[illegible] 324	0.[illegible] 185	0.[illegible] 38	0.[illegible] 156	0.[illegible] 26
PCO16	.900	-0.057	0.[illegible] 68	0.[illegible] 10	0.[illegible] 124	0.[illegible] [illegible]	0.[illegible] 44	0.[illegible] 206	0.[illegible] 350	0.[illegible] 64	0.[illegible] 125
PCO17	.969	-0.059	0.[illegible] 154	0.[illegible] 132	0.[illegible] 224	0.[illegible] [illegible]	0.[illegible] 270	0.[illegible] 326	0.[illegible] 150	0.[illegible] 175	0.[illegible] 187

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FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	51.57	0.191	0.409	5.61	0.0	7.47	12081.2	20

V	Q	RN	CM(MINI	CM(MAXI	ALPHA,MMAX	AERO DAMP	FOR	EXT DAMP
137.7 (451.8)	49585. (1035.6)	0.65E 07	-0.035	1.217	12.68	-0.00095	1.07?	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	P.I	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.467	5.608	0	0.330	4	0.110	348	0.070	257	0.034	74	0.024	76	0.017	23	0.019	337	0.007	126
CN		0.736	0.416	18	0.077	324	0.028	116	0.014	330	0.009	171	0.006	109	0.006	14	0.005	338	0.004	219
CM		-0.091	0.030	279	0.012	45	0.014	271	0.005	139	0.001	329	0.000	85	0.001	295	0.001	239	0.001	91
DCP 1	.010	3.120	2.074	354	0.744	40	0.624	328	0.304	237	0.024	340	0.152	213	0.093	115	0.048	318	0.050	160
DCP 2	.020	2.844	1.942	2	0.473	15	0.272	319	0.165	233	0.098	189	0.100	150	0.068	93	0.067	51	0.062	2
DCP 3	.030	2.733	1.706	1	0.363	1	0.193	291	0.141	206	0.090	133	0.086	95	0.070	26	0.060	329	0.036	289
DCP 4	.049	2.368	1.279	5	0.355	10	0.150	289	0.066	183	0.019	145	0.059	123	0.088	28	0.070	307	0.039	221
DCP 5	.074	2.061	1.076	6	0.285	355	0.103	255	0.052	135	0.007	158	0.067	97	0.069	354	0.046	255	0.026	156
DCP 6	.099	1.871	0.948	8	0.246	340	0.093	213	0.051	99	0.004	262	0.040	89	0.058	334	0.040	236	0.025	147
DCP 7	.149	1.428	0.830	8	0.215	316	0.106	175	0.067	59	0.013	299	0.026	58	0.047	286	0.026	192	0.017	126
DCP 8	.200	1.159	0.673	14	0.155	314	0.082	158	0.045	33	0.020	196	0.024	55	0.027	300	0.020	190	0.022	138
DCP 9	.250	1.010	0.587	13	0.123	294	0.084	130	0.051	8	0.009	195	0.017	335	0.021	207	0.015	58	0.007	295
DCP10	.300	0.880	0.501	14	0.099	285	0.083	116	0.048	356	0.013	229	0.006	244	0.014	157	0.018	27	0.007	310
DCP11	.399	0.711	0.402	27	0.073	290	0.072	119	0.032	344	0.010	166	0.010	284	0.015	142	0.019	32	0.008	282
DCP12	.501	0.536	0.329	37	0.059	290	0.064	107	0.033	334	0.012	183	0.001	200	0.011	105	0.015	25	0.010	271
DCP13	.600	0.425	0.262	44	0.046	295	0.057	96	0.031	319	0.016	164	0.006	147	0.005	102	0.005	354	0.006	298
DCP14	.701	0.363	0.200	64	0.038	302	0.044	91	0.024	284	0.012	126	0.001	167	0.011	94	0.001	287	0.003	161
DCP15	.800	0.181	0.145	66	0.024	263	0.043	76	0.024	289	0.009	149	0.007	149	0.008	26	0.005	265	0.006	203
DCP16	.900	-0.041	0.066	42	0.038	210	0.035	54	0.007	226	0.002	148	0.005	61	0.008	353	0.005	92	0.004	277
DCP17	.969	-0.053	0.024	43	0.020	238	0.015	71	0.003	359	0.004	343	0.009	117	0.009	272	0.003	299	0.006	242

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	51.51	0.192	0.406	5.53	0.0	9.97	12081.3	20

V	Q	RN	CM(MINI	CM(MAXI	ALPHA,MMAX	AERO DAMP	FOR	EXT DAMP
136.4 (447.4)	48823. (1019.7)	0.65E 07	-0.131	1.461	15.40	-0.00067	0.748	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.972	5.531	0	0.441	18	0.177	327	0.025	269	0.029	76	0.024	11	0.039	172	0.017	292	0.007	135
CN		0.868	0.465	36	0.114	326	0.020	199	0.026	111	0.017	341	0.004	17	0.012	282	0.005	184	0.002	66
CM		-0.017	0.044	214	0.040	58	0.019	321	0.014	269	0.009	157	0.002	165	0.004	71	0.004	305	0.003	185
DCP 1	.010	3.821	1.086	11	0.942	71	0.487	16	0.130	24	0.193	7	0.156	313	0.033	313	0.056	313	0.029	295
DCP 2	.020	3.183	1.124	29	0.678	50	0.236	2	0.133	23	0.168	344	0.140	299	0.094	255	0.049	252	0.048	239
DCP 3	.030	2.804	0.787	44	0.838	55	0.425	350	0.149	301	0.104	297	0.111	257	0.088	203	0.037	176	0.042	187
DCP 4	.049	2.647	0.944	38	0.588	29	0.174	311	0.024	348	0.062	287	0.037	212	0.010	289	0.057	225	0.057	147
DCP 5	.074	2.277	0.862	40	0.491	18	0.129	300	0.054	327	0.084	246	0.049	154	0.016	321	0.034	210	0.041	120
DCP 6	.099	2.050	0.808	42	0.418	8	0.103	287	0.054	328	0.085	236	0.043	142	0.009	258	0.023	159	0.024	97
DCP 7	.149	1.692	0.770	38	0.345	348	0.098	255	0.034	250	0.054	190	0.021	112	0.023	161	0.038	85	0.029	36
DCP 8	.200	1.319	0.711	40	0.282	343	0.086	256	0.048	225	0.051	165	0.020	90	0.011	161	0.025	62	0.016	18
DCP 9	.250	1.165	0.671	35	0.257	324	0.079	232	0.057	203	0.061	136	0.044	61	0.022	2	0.022	350	0.028	309
DCP10	.300	1.048	0.623	31	0.215	308	0.066	214	0.067	177	0.048	91	0.016	51	0.027	38	0.036	326	0.027	247
DCP11	.399	0.892	0.568	34	0.177	297	0.059	204	0.075	165	0.053	73	0.014	57	0.045	19	0.044	298	0.030	211
DCP12	.501	0.676	0.462	36	0.146	286	0.065	184	0.087	130	0.063	26	0.008	336	0.036	328	0.037	251	0.032	159
DCP13	.600	0.534	0.381	40	0.115	266	0.072	156	0.083	109	0.070	351	0.011	16	0.044	296	0.046	185	0.026	95
DCP14	.701	0.450	0.290	45	0.128	246	0.085	119	0.064	66	0.057	315	0.008	344	0.043	246	0.037	132	0.029	23
DCP15	.800	0.263	0.221	34	0.127	231	0.074	108	0.051	58	0.036	301	0.015	335	0.042	220	0.031	96	0.025	349
DCP16	.900	0.014	0.137	15	0.088	224	0.047	139	0.056	41	0.035	291	0.014	264	0.019	168	0.020	67	0.022	330
DCP17	.969	-0.028	0.060	4	0.045	246	0.016	153	0.033	80	0.025	305	0.003	313	0.008	201	0.013	107	0.008	345

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	51.64	0.196	0.403	5.47	0.0	12.51	12081.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.4 (444.2)	48263. (1008.0)	0.64E 07	-0.221	1.724	17.38	-0.00074	0.822	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		12.513	5.467 0	0.417 31	0.336 350	0.049 126	0.044 122	0.039 34	0.033 214	0.030 268	0.009 220
CN		0.999	0.502 47	0.101 356	0.053 315	0.025 217	0.028 156	0.017 86	0.010 70	0.011 14	0.006 305
CM		-0.037	0.088 201	0.045 88	0.022 53	0.018 339	0.012 298	0.009 241	0.005 196	0.005 156	0.004 87
DCP 1	.010	4.017	0.446 125	1.180 93	0.220 94	0.191 71	0.068 174	0.031 145	0.043 180	0.007 131	0.039 201
DCP 2	.023	3.438	0.627 90	0.801 87	0.269 64	0.124 49	0.107 91	0.059 56	0.026 123	0.019 94	0.016 261
DCP 3	.030	3.048	0.669 110	0.886 81	0.276 39	0.129 48	0.108 51	0.052 8	0 030 92	0.037 35	0.003 348
DCP 4	.049	2.849	0.804 85	0.555 53	0.089 46	0.107 33	0.025 49	0.037 58	0.057 42	0.014 351	0.017 19
DCP 5	.074	2.466	0.808 77	0.432 40	0.105 49	0.130 7	0.036 316	0.003 305	0.032 40	0.010 339	0.014 10
DCP 6	.099	2.227	0.793 70	0.338 31	0.119 54	0.130 358	0.044 319	0.030 309	0.014 341	0.012 252	0.003 261
DCP 7	.149	1.792	0.774 5.	0.257 19	0.141 13	0.109 313	0.026 276	0.025 297	0.023 311	0.012 194	0.009 317
DCP 8	.200	1.497	0.721 55	0.232 20	0.162 359	0.092 293	0.015 305	0.036 287	0.023 248	0.004 303	0.019 263
DCP 9	.250	1.327	0.729 48	0.219 3	0.195 337	0.123 264	0.056 232	0.027 234	0.051 207	0.036 170	0.029 124
DCP10	.300	1.185	0.660 44	0.172 357	0.180 331	0.115 258	0.075 216	0.043 179	0.040 165	0.029 124	0.031 96
DCP11	.399	1.028	0.647 44	0.141 341	0.148 331	0.108 256	0.086 219	0.061 163	0.041 142	0.036 101	0.033 76
DCP12	.501	0.812	0.585 40	0.135 315	0.119 299	0.092 220	0.080 182	0.060 131	0.054 100	0.051 49	0.032 5
DCP13	.600	0.667	0.533 38	0.156 292	0.107 264	0.094 185	0.089 154	0.066 94	0.056 69	0.066 16	0.044 312
DCP14	.701	0.570	0.445 35	0.182 272	0.106 224	0.104 150	0.084 113	0.062 56	0.049 14	0.044 318	0.043 274
DCP15	.800	0.367	0.370 24	0.183 261	0.113 203	0.097 126	0.070 82	0.058 20	0.036 328	0.032 280	0.021 218
DCP16	.900	0.084	0.240 8	0.098 256	0.075 197	0.063 108	0.048 62	0.025 18	0.027 310	0.027 285	0.030 206
DCP17	.969	-0.009	0.099 9	0.044 282	0.028 204	0.031 124	0.027 59	0.027 1	0.013 270	0.001 112	0.005 3

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	51.73	0.196	0.400	5.38	0.0	15.07	12081.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.3 (440.8)	47665. (995.5)	0.64E 07	-0.266	1.966	18.61	-0.00107	1.147	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		15.071	5.376 0	0.284 27	0.312 22	0.078 188	0.023 196	0.029 73	0.025 282	0.022 9	0.016 198
CN		1.078	0.547 55	0.068 71	0.072 8	0.049 305	0.023 223	0.017 259	0.015 208	0.010 165	0.010 60
CM		-0.060	0.121 199	0.038 128	0.030 132	0.021 62	0.010 350	0.006 50	0.005 354	0.006 318	0.007 238
DCP 1	.010	3.754	1.478 159	0.760 127	0.208 180	0.095 176	0.034 249	0.014 247	0.017 29	0.014 330	0.025 259
DCP 2	.020	3.417	1.077 134	0.591 110	0.268 135	0.152 140	0.090 207	0.042 203	0.041 220	0.021 315	0.047 287
DCP 3	.030	3.060	1.103 137	0.563 108	0.297 129	0.161 94	0.092 188	0.087 140	0.043 173	0.036 151	0.018 212
DCP 4	.049	2.912	1.005 109	0.301 90	0.236 103	0.076 65	0.029 158	0.025 177	0.044 191	0.014 172	0.027 178
DCP 5	.074	2.530	0.955 95	0.187 77	0.215 88	0.066 72	0.043 111	0.033 115	0.027 141	0.024 139	0.023 109
DCP 6	.099	2.280	0.907 88	0.153 87	0.256 72	0.048 26	0.023 87	0.030 93	0.011 104	0.018 66	0.014 93
DCP 7	.149	1.870	0.846 69	0.148 85	0.268 51	0.076 14	0.030 12	0.036 19	0.015 204	0.011 83	0.019 107
DCP 8	.200	1.586	0.769 67	0.171 79	0.219 44	0.071 11	0.020 349	0.020 0	0.006 110	0.011 331	0.011 4
DCP 9	.250	1.400	0.752 61	0.180 69	0.245 25	0.146 354	0.071 307	0.029 353	0.036 349	0.042 323	0.031 300
DCP10	.300	1.261	0.689 55	0.165 60	0.215 20	0.153 350	0.070 297	0.048 335	0.032 313	0.035 300	0.027 299
DCP11	.399	1.118	0.693 50	0.114 45	0.176 22	0.166 347	0.084 289	0.060 308	0.053 289	0.029 286	0.031 272
DCP12	.501	0.927	0.683 43	0.098 0	0.151 357	0.149 320	0.081 259	0.072 270	0.055 238	0.042 227	0.035 172
DCP13	.600	0.781	0.651 37	0.124 326	0.127 316	0.129 284	0.080 226	0.077 241	0.063 204	0.062 182	0.067 123
DCP14	.701	0.670	0.578 32	0.153 311	0.144 279	0.144 238	0.091 173	0.067 195	0.053 156	0.042 137	0.058 77
DCP15	.800	0.464	0.497 23	0.167 304	0.167 261	0.143 208	0.078 142	0.060 146	0.038 105	0.034 91	0.045 24
DCP16	.900	0.150	0.309 12	0.118 297	0.083 238	0.083 189	0.056 104	0.003 111	0.019 126	0.038 9	0.044 10
DCP17	.969	0.020	0.141 15	0.062 301	0.042 231	0.041 182	0.033 97	0.035 320	0.007 243	0.023 136	0.010 96

REPRODUCIBILITY OF THE
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FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	52.47	0.191	0.414	5.65	0.0	4.98	12083.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
139.9 (458.9)	50696. (1058.8)	0.66E 07	-0.038	0.962	10.47	-0.00077	0.891	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.577	5.653	0	0.316	4	0.171	357	0.033	21	0.023	62	0.025	62	0.026	245	0.016	299	0.012	97
CN		0.581	0.400	1	0.028	17	0.010	49	0.003	316	0.001	179	0.002	87	0.002	347	0.003	343	0.001	228
CM		-0.007	0.029	301	0.003	259	0.003	320	0.002	235	0.001	97	0.001	240	0.001	176	0.001	200	0.001	51
DCP 1	.010	2.546	3.133	342	0.242	279	0.013	90	0.079	224	0.076	137	0.030	9	0.017	275	0.021	265	0.006	270
DCP 2	.020	2.012	2.137	349	0.134	10	0.067	2	0.011	21	0.036	317	0.055	217	0.036	125	0.018	331	0.004	65
DCP 3	.030	1.658	1.861	348	0.121	7	0.073	351	0.028	255	0.012	136	0.001	127	0.006	196	0.013	310	0.003	17
DCP 4	.049	1.434	1.560	349	0.096	3	0.058	354	0.022	258	0.008	139	0.002	123	0.005	180	0.002	17	0.002	78
DCP 5	.074	1.602	1.295	350	0.077	2	0.042	359	0.017	254	0.004	114	0.007	175	0.000	139	0.002	220	0.004	231
DCP 6	.099	1.472	1.025	352	0.073	7	0.033	10	0.015	263	0.009	132	0.004	177	0.006	76	0.006	262	0.002	109
DCP 7	.149	1.084	0.771	353	0.051	4	0.028	356	0.010	281	0.007	207	0.007	256	0.006	279	0.005	288	0.006	31
DCP 8	.200	0.882	0.626	0	0.042	23	0.022	31	0.012	303	0.003	230	0.001	268	0.004	341	0.003	245	0.002	341
DCP 9	.250	0.781	0.521	359	0.037	18	0.020	37	0.005	317	0.003	182	0.004	46	0.006	291	0.006	313	0.003	352
DCP10	.300	0.677	0.433	0	0.029	19	0.011	38	0.003	312	0.004	276	0.003	98	0.003	313	0.009	317	0.002	102
DCP11	.349	0.562	0.346	13	0.029	38	0.013	90	0.004	324	0.001	212	0.004	113	0.003	26	0.007	359	0.004	64
DCP12	.501	0.495	0.267	19	0.024	48	0.011	91	0.004	70	0.002	320	0.004	181	0.003	1	0.005	0	0.003	183
DCP13	.600	0.368	0.204	27	0.024	48	0.009	116	0.006	47	0.002	67	0.004	44	0.004	353	0.005	341	0.002	180
DCP14	.701	0.355	0.133	38	0.022	47	0.011	99	0.006	30	0.004	244	0.003	85	0.003	0	0.004	18	0.002	315
DCP15	.800	0.180	0.093	55	0.014	37	0.012	147	0.006	27	0.003	249	0.002	347	0.004	0	0.005	16	0.005	233
DCP16	.900	-0.056	0.098	81	0.009	345	0.003	176	0.006	64	0.003	345	0.009	83	0.003	313	0.005	42	0.007	264
DCP17	.969	-0.058	0.026	148	0.010	208	0.005	154	0.004	158	0.003	183	0.010	31	0.003	120	0.005	16	0.005	175

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	52.81	0.195	0.411	5.62	0.0	7.48	12083.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
138.2 (453.4)	49843. (1041.0)	0.65E 07	-0.036	1.192	12.91	-0.00097	1.109	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.478	5.618	0	0.377	3	0.142	339	0.051	271	0.036	75	0.019	54	0.005	180	0.017	303	0.013	114
CN		0.738	0.603	18	0.068	324	0.022	107	0.010	332	0.007	179	0.005	96	0.004	1	0.002	50	0.004	145
CM		-0.001	0.032	282	0.010	46	0.013	263	0.005	125	0.001	335	0.001	324	0.002	244	0.002	208	0.001	71
DCP 1	.010	3.296	3.053	352	0.631	39	0.507	319	0.185	211	0.054	314	0.137	184	0.096	69	0.034	260	0.041	101
DCP 2	.020	2.451	1.798	2	0.426	15	0.240	304	0.118	218	0.073	178	0.080	129	0.055	64	0.054	0	0.047	311
DCP 3	.030	2.746	1.687	0	0.324	358	0.172	284	0.112	188	0.069	120	0.056	66	0.054	332	0.038	253	0.021	207
DCP 4	.049	2.380	1.268	4	0.327	8	0.141	287	0.061	170	0.023	161	0.049	89	0.060	333	0.049	240	0.020	158
DCP 5	.074	2.064	1.068	6	0.261	351	0.106	241	0.066	114	0.015	0	0.025	51	0.068	302	0.052	195	0.032	90
DCP 6	.099	1.861	1.910	8	0.223	342	0.096	216	0.062	95	0.016	310	0.022	86	0.037	304	0.040	197	0.031	96
DCP 7	.149	1.419	0.787	8	0.160	319	0.070	187	0.047	60	0.018	232	0.021	48	0.025	270	0.019	158	0.009	44
DCP 8	.200	1.160	0.655	14	0.130	312	0.068	162	0.028	63	0.009	142	0.016	339	0.029	229	0.020	97	0.006	1
DCP 9	.250	1.018	0.576	12	0.109	291	0.077	171	0.050	6	0.004	188	0.013	321	0.027	187	0.021	52	0.003	281
DCP10	.300	0.878	0.489	15	0.088	289	0.063	113	0.035	356	0.011	194	0.011	298	0.014	191	0.018	49	0.004	290
DCP11	.349	0.715	0.397	26	0.062	291	0.060	107	0.030	339	0.011	208	0.006	337	0.009	130	0.012	27	0.003	167
DCP12	.501	0.534	0.315	34	0.049	293	0.060	96	0.030	327	0.013	213	0.004	142	0.012	82	0.007	353	0.018	160
DCP13	.600	0.425	0.252	47	0.041	297	0.054	90	0.030	318	0.012	172	0.006	121	0.014	60	0.008	343	0.012	166
DCP14	.701	0.369	0.201	66	0.031	311	0.039	78	0.023	294	0.009	128	0.008	193	0.014	67	0.009	353	0.009	145
DCP15	.800	0.187	0.144	68	0.023	263	0.038	64	0.022	269	0.009	123	0.005	171	0.014	26	0.016	37	0.006	179
DCP16	.900	-0.049	0.072	97	0.029	220	0.025	53	0.007	249	0.006	124	0.013	75	0.007	332	0.006	109	0.007	235
DCP17	.969	-0.057	0.017	52	0.020	225	0.012	35	0.009	217	0.005	269	0.012	120	0.007	335	0.001	107	0.001	291

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	52.78	0.197	0.406	5.55	0.0	10.51	12083.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.7 (448.4)	48996. (1023.3)	0.65E 07	-0.126	1.416	16.01	-0.00053	0.600	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.508	5.548	0	0.373	17	0.245	313	0.030	111	0.016	73	0.036	39	0.028	167	0.001	21	0.012	186
CN		0.870	0.454	38	0.094	329	0.012	203	0.025	97	0.013	329	0.007	20	0.011	262	0.008	177	0.003	72
CM		-0.017	0.045	206	0.038	55	0.015	321	0.013	267	0.007	141	0.002	185	0.004	42	0.003	282	0.001	176
DCP 1	.010	3.813	0.862	21	0.985	75	0.371	21	0.141	34	0.088	27	0.045	358	0.030	38	0.012	266	0.017	57
DCP 2	.020	3.271	0.970	79	0.701	59	0.235	10	0.121	22	0.098	1	0.080	330	0.031	294	0.017	257	0.012	13
DCP 3	.030	2.841	0.759	7	0.835	57	0.355	353	0.116	329	0.074	328	0.071	296	0.039	251	0.031	222	0.008	136
DCP 4	.049	2.665	0.882	47	0.569	35	0.152	322	0.056	353	0.046	284	0.023	290	0.006	279	0.020	298	0.014	272
DCP 5	.074	2.287	0.825	49	0.476	23	0.113	309	0.062	336	0.048	257	0.019	206	0.001	170	0.019	227	0.003	175
DCP 6	.099	2.052	0.784	50	0.401	13	0.086	300	0.058	324	0.049	226	0.013	161	0.015	191	0.014	151	0.012	330
DCP 7	.149	1.630	0.788	42	0.325	351	0.082	279	0.060	271	0.059	206	0.022	152	0.012	161	0.016	122	0.008	64
DCP 8	.200	1.350	0.707	44	0.263	349	0.071	286	0.048	256	0.041	202	0.017	190	0.015	154	0.013	169	0.021	89
DCP 9	.250	1.166	0.682	35	0.233	319	0.062	230	0.058	202	0.063	129	0.034	59	0.018	35	0.022	326	0.016	285
DCP10	.300	1.035	0.615	31	0.192	304	0.055	215	0.066	176	0.057	94	0.031	31	0.028	339	0.032	270	0.023	188
DCP11	.399	0.868	0.557	36	0.174	296	0.058	208	0.074	154	0.042	69	0.023	51	0.038	345	0.042	255	0.032	160
DCP12	.501	0.669	0.463	36	0.146	280	0.064	185	0.092	117	0.054	3	0.017	56	0.043	302	0.041	196	0.025	83
DCP13	.600	0.538	0.383	38	0.133	260	0.064	149	0.077	95	0.056	336	0.015	5	0.049	259	0.043	150	0.032	38
DCP14	.701	0.452	0.287	43	0.118	237	0.062	123	0.063	73	0.053	312	0.017	335	0.040	213	0.039	93	0.023	337
DCP15	.800	0.274	0.216	29	0.115	219	0.052	110	0.060	57	0.036	299	0.010	287	0.029	186	0.018	81	0.011	303
DCP16	.900	0.018	0.141	8	0.082	213	0.038	107	0.036	34	0.024	258	0.006	198	0.015	132	0.020	30	0.011	238
DCP17	.969	-0.045	0.045	16	0.029	235	0.017	135	0.019	41	0.013	261	0.002	205	0.016	141	0.013	13	0.005	210

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	52.78	0.197	0.405	5.36	0.0	12.53	12083.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.1 (446.6)	48737. (1017.9)	0.65E 07	-0.214	1.656	17.50	-0.00057	0.639	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.525	5.359	0	0.379	32	0.303	325	0.058	119	0.022	71	0.030	10	0.037	149	0.012	215	0.019	163
CN		0.992	0.495	06	0.092	353	0.049	299	0.027	186	0.015	106	0.008	70	0.010	27	0.008	310	0.004	201
CM		-0.038	0.084	197	0.043	81	0.023	40	0.017	317	0.008	233	0.002	175	0.004	160	0.005	85	0.004	333
DCP 1	.010	3.973	0.471	110	1.101	92	0.235	95	0.135	76	0.067	156	0.070	95	0.031	20	0.041	261	0.013	215
DCP 2	.020	3.383	0.692	87	0.770	82	0.194	60	0.090	78	0.101	103	0.074	78	0.022	59	0.006	205	0.011	305
DCP 3	.030	2.995	0.715	106	0.874	78	0.253	36	0.115	44	0.083	46	0.055	35	0.022	25	0.005	47	0.010	276
DCP 4	.049	2.825	0.818	82	0.562	53	0.112	31	0.103	11	0.007	349	0.029	29	0.014	330	0.011	311	0.028	226
DCP 5	.074	2.446	0.822	74	0.421	39	0.113	39	0.123	352	0.021	296	0.025	348	0.012	280	0.015	139	0.016	108
DCP 6	.099	2.193	0.804	70	0.341	33	0.126	33	0.106	339	0.019	302	0.005	44	0.023	23	0.006	295	0.009	87
DCP 7	.149	1.766	0.809	55	0.253	9	0.145	5	0.123	301	0.051	254	0.029	214	0.005	185	0.010	101	0.016	316
DCP 8	.200	1.482	0.761	55	0.234	14	0.158	358	0.106	295	0.033	238	0.015	231	0.006	72	0.013	336	0.016	265
DCP 9	.250	1.324	0.699	48	0.203	4	0.177	325	0.114	239	0.041	194	0.022	149	0.019	169	0.028	118	0.016	53
DCP10	.300	1.190	0.638	43	0.175	359	0.170	314	0.103	225	0.040	192	0.030	158	0.032	144	0.038	94	0.028	22
DCP11	.399	1.013	0.600	43	0.130	342	0.138	308	0.097	218	0.054	174	0.034	117	0.031	108	0.046	42	0.026	325
DCP12	.501	0.814	0.566	38	0.129	308	0.116	282	0.105	195	0.067	134	0.035	80	0.044	62	0.051	345	0.033	256
DCP13	.600	0.670	0.523	35	0.154	285	0.098	251	0.100	168	0.067	108	0.037	54	0.049	28	0.055	310	0.033	220
DCP14	.701	0.570	0.433	32	0.170	265	0.105	216	0.096	126	0.057	47	0.026	346	0.034	331	0.041	250	0.027	167
DCP15	.800	0.374	0.368	19	0.171	253	0.116	192	0.102	104	0.063	21	0.032	316	0.034	293	0.038	223	0.029	124
DCP16	.900	0.078	0.229	8	0.090	244	0.071	180	0.054	76	0.040	352	0.012	255	0.017	285	0.024	206	0.025	95
DCP17	.969	-0.017	0.092	7	0.038	267	0.032	183	0.026	83	0.017	14	0.006	205	0.013	312	0.011	248	0.012	147

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	52.80	0.199	0.402	5.38	0.0	15.10	12083.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TOR	EXT DAMP
134.9 (442.6)	48038. (1003.3)	0.64E 07	-0.264	1.862	18.42	-0.00101	1.123	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.005	5.376	0	0.241	40	0.335	92	0.092	165	0.034	230	0.031	40	0.043	217	0.016	30	0.027	197
CN		1.081	0.943	55	0.073	40	0.096	2	0.059	282	0.019	205	0.017	210	0.006	142	0.009	172	0.003	345
CM		-0.061	0.119	198	0.034	123	0.030	109	0.021	49	0.006	330	0.006	21	0.003	302	0.005	289	0.005	177
DCP 1	.010	3.913	1.475	160	0.721	120	0.199	166	0.073	254	0.118	218	0.024	87	0.027	219	0.034	259	0.020	253
DCP 2	.020	3.448	1.037	132	0.599	109	0.221	120	0.066	177	0.145	198	0.070	173	0.055	253	0.040	260	0.026	298
DCP 3	.030	2.993	1.154	139	0.561	103	0.318	128	0.136	84	0.116	166	0.101	119	0.046	161	0.032	139	0.040	224
DCP 4	.049	2.889	1.002	108	0.280	87	0.242	105	0.045	53	0.057	137	0.035	92	0.009	141	0.017	298	0.044	231
DCP 5	.076	2.517	0.950	95	0.204	77	0.233	86	0.048	13	0.040	112	0.018	129	0.037	145	0.015	117	0.034	141
DCP 6	.099	2.266	0.904	87	0.182	79	0.238	69	0.041	0	0.025	89	0.042	123	0.025	56	0.012	248	0.030	147
DCP 7	.149	1.851	0.835	71	0.186	81	0.274	40	0.071	336	0.021	351	0.018	26	0.017	310	0.017	296	0.012	175
DCP 8	.200	1.587	0.796	67	0.205	71	0.265	33	0.097	347	0.026	349	0.043	35	0.029	337	0.009	263	0.013	74
DCP 9	.250	1.422	0.765	58	0.183	66	0.267	21	0.137	332	0.059	294	0.031	304	0.039	308	0.036	275	0.036	262
DCP10	.300	1.282	0.699	51	0.171	58	0.241	9	0.138	318	0.068	274	0.041	258	0.019	266	0.033	258	0.019	253
DCP11	.399	1.128	0.695	50	0.119	53	0.203	14	0.157	326	0.070	273	0.052	276	0.030	265	0.038	258	0.011	217
DCP12	.501	0.922	0.661	43	0.091	15	0.161	348	0.163	292	0.052	240	0.064	243	0.042	200	0.046	185	0.029	122
DCP13	.600	0.776	0.660	37	0.106	327	0.141	315	0.138	259	0.054	201	0.068	212	0.044	165	0.052	147	0.041	67
DCP14	.701	0.677	0.570	30	0.142	306	0.168	279	0.133	225	0.062	157	0.054	168	0.037	117	0.045	104	0.033	358
DCP15	.800	0.469	0.496	22	0.153	303	0.153	256	0.119	200	0.063	129	0.034	117	0.021	65	0.033	70	0.035	333
DCP16	.900	0.152	0.298	12	0.099	288	0.070	235	0.065	180	0.034	79	0.011	147	0.017	45	0.019	23	0.026	306
DCP17	.969	0.029	0.142	12	0.065	291	0.041	221	0.050	161	0.028	79	0.015	343	0.013	308	0.014	108	0.002	309

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA,0	TEST POINT	CYCLES ANALYSED
0.0	53.38	0.192	0.419	5.68	0.0	4.96	12085.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TOR	EXT DAMP
141.8 (465.1)	51921. (1084.4)	0.66E 07	-0.038	0.951	10.59	-0.00076	0.992	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.960	5.678	0	0.345	3	0.173	350	0.030	200	0.024	62	0.012	26	0.020	226	0.017	255	0.013	111
CN		0.568	0.597	1	0.027	17	0.012	27	0.001	9	0.001	340	0.002	287	0.003	5	0.001	98		
CM		-0.037	0.029	298	0.003	254	0.002	325	0.001	211	0.000	128	0.001	131	0.001	152	0.001	206	0.000	285
DCP 1	.010	2.534	1.059	342	0.250	276	0.036	25	0.027	238	0.068	98	0.034	349	0.007	279	0.017	282	0.009	268
DCP 2	.020	1.964	2.105	349	0.129	9	0.070	351	0.027	68	0.045	320	0.054	217	0.037	132	0.016	6	0.006	344
DCP 3	.030	1.912	1.831	348	0.110	11	0.083	351	0.016	226	0.013	135	0.003	96	0.006	211	0.005	298	0.001	115
DCP 4	.049	1.793	1.531	349	0.091	5	0.070	349	0.017	215	0.008	147	0.006	172	0.006	212	0.004	242	0.002	127
DCP 5	.076	1.573	1.218	350	0.073	1	0.048	353	0.009	234	0.002	195	0.007	83	0.006	263	0.002	92	0.002	70
DCP 6	.099	1.435	1.010	352	0.069	7	0.039	358	0.008	215	0.002	285	0.003	139	0.001	219	0.002	315	0.002	27
DCP 7	.149	1.060	0.759	353	0.043	6	0.031	6	0.007	184	0.003	253	0.005	287	0.017	169	0.006	233	0.003	136
DCP 8	.200	0.861	0.618	0	0.038	22	0.019	16	0.003	319	0.003	351	0.005	165	0.006	280	0.007	347	0.002	49
DCP 9	.250	0.759	0.514	359	0.034	11	0.021	14	0.006	33	0.001	142	0.008	217	0.006	294	0.002	237	0.001	284
DCP10	.300	0.662	0.437	0	0.031	19	0.017	16	0.006	353	0.005	272	0.003	242	0.005	164	0.002	312	0.001	236
DCP11	.399	0.568	0.367	13	0.028	38	0.012	45	0.003	358	0.002	317	0.006	312	0.005	307	0.007	97	0.001	244
DCP12	.501	0.425	0.264	19	0.025	39	0.011	71	0.003	64	0.002	315	0.004	324	0.006	300	0.008	27	0.004	89
DCP13	.600	0.363	0.200	28	0.023	40	0.009	83	0.004	44	0.002	39	0.005	201	0.006	347	0.004	20	0.005	147
DCP14	.701	0.346	0.142	39	0.019	47	0.007	102	0.002	17	0.005	4	0.004	319	0.005	349	0.006	359	0.003	23
DCP15	.800	0.174	0.093	53	0.015	50	0.006	157	0.003	30	0.001	139	0.002	119	0.001	12	0.002	35	0.002	46
DCP16	.900	-0.054	0.060	73	0.005	58	0.003	238	0.003	40	0.004	240	0.004	311	0.003	296	0.003	212	0.004	144
DCP17	.969	-0.061	0.019	145	0.006	329	0.005	144	0.006	21	0.002	339	0.004	275	0.001	224	0.005	34	0.005	277

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	53.85	0.196	0.415	5.67	0.0	7.47	12085.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
139.8 (458.6)	50988. (1064.9)	0.66E 07	-0.039	1.172	13.11	-0.00096	1.103	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.474	5.671	0	0.367	6	0.152	319	0.029	229	0.031	61	0.028	55	0.015	161	0.013	290	0.016	149
CN		0.718	0.405	19	0.066	325	0.024	115	0.009	328	0.006	177	0.002	110	0.004	330	0.001	172	0.005	115
CM		-0.002	0.032	279	0.009	43	0.013	272	0.004	116	0.001	332	0.001	16	0.001	207	0.001	202	0.001	352
DCP 1	.010	2.790	1.960	353	0.654	39	0.566	317	0.216	214	0.017	325	0.110	175	0.077	65	0.043	245	0.052	110
DCP 2	.020	2.774	1.765	2	0.421	16	0.243	303	0.110	214	0.054	171	0.060	116	0.046	54	0.051	356	0.044	216
DCP 3	.030	2.684	1.660	0	0.311	358	0.170	287	0.105	191	0.065	116	0.055	54	0.053	332	0.040	259	0.017	241
DCP 4	.049	2.524	1.354	4	0.317	6	0.144	279	0.055	159	0.015	191	0.043	94	0.058	334	0.048	241	0.009	169
DCP 5	.074	2.025	1.066	6	0.258	350	0.108	250	0.058	120	0.009	31	0.021	38	0.048	295	0.044	195	0.025	86
DCP 6	.099	1.833	0.939	8	0.214	338	0.074	213	0.050	81	0.027	290	0.008	81	0.037	276	0.040	178	0.030	84
DCP 7	.149	1.391	0.788	8	0.160	313	0.079	159	0.050	41	0.012	232	0.017	29	0.028	269	0.019	167	0.010	61
DCP 8	.200	1.133	0.665	14	0.126	309	0.066	160	0.039	38	0.005	309	0.017	349	0.028	231	0.016	108	0.008	36
DCP 9	.250	0.999	0.571	13	0.108	295	0.075	127	0.040	13	0.009	178	0.017	306	0.024	187	0.019	66	0.007	59
DCP10	.300	0.856	0.481	14	0.077	284	0.067	106	0.036	347	0.011	177	0.009	298	0.014	147	0.012	56	0.006	34
DCP11	.399	0.694	0.398	28	0.059	298	0.061	118	0.028	356	0.008	221	0.007	220	0.014	115	0.013	16	0.009	170
DCP12	.501	0.524	0.321	34	0.045	289	0.063	101	0.029	320	0.011	208	0.006	232	0.014	82	0.009	323	0.009	149
DCP13	.600	0.416	0.262	47	0.039	303	0.053	96	0.024	306	0.010	154	0.006	244	0.012	39	0.004	330	0.006	127
DCP14	.701	0.358	0.207	65	0.032	315	0.042	92	0.023	277	0.015	137	0.005	152	0.011	355	0.005	246	0.004	136
DCP15	.800	0.144	0.149	66	0.018	262	0.038	83	0.021	260	0.006	125	0.008	154	0.015	352	0.001	307	0.003	107
DCP16	.900	-0.040	0.070	49	0.027	207	0.024	56	0.008	211	0.001	351	0.010	103	0.006	292	0.005	90	0.005	189
DCP17	.969	-0.057	0.025	53	0.016	235	0.012	94	0.005	199	0.002	233	0.003	267	0.009	300	0.002	102	0.008	190

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	53.94	0.199	0.411	5.57	0.0	10.13	12085.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
138.3 (453.7)	50068. (1045.7)	0.65E 07	-0.133	1.418	15.70	-0.00054	0.618	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.127	5.573	0	0.420	16	0.325	298	0.025	28	0.034	68	0.021	15	0.031	105	0.012	78	0.010	206
CN		0.845	0.459	36	0.099	324	0.019	220	0.027	99	0.009	338	0.011	339	0.008	233	0.008	163	0.000	239
CM		-0.019	0.045	209	0.038	54	0.017	315	0.012	260	0.007	149	0.004	113	0.005	26	0.004	298	0.002	211
DCP 1	.010	3.173	0.934	16	0.989	71	0.398	4	0.139	22	0.093	355	0.070	325	0.017	9	0.008	194	0.009	334
DCP 2	.020	3.040	1.027	32	0.674	56	0.243	0	0.141	14	0.097	332	0.073	301	0.011	253	0.009	327	0.028	327
DCP 3	.030	2.761	0.807	46	0.777	53	0.353	339	0.096	306	0.052	300	0.067	271	0.032	182	0.006	186	0.007	302
DCP 4	.049	2.583	0.811	41	0.555	34	0.183	314	0.054	342	0.044	263	0.020	219	0.010	64	0.016	287	0.027	268
DCP 5	.074	2.237	0.842	42	0.464	19	0.151	292	0.027	321	0.043	226	0.003	74	0.011	306	0.020	204	0.011	220
DCP 6	.099	2.003	0.798	45	0.402	9	0.116	287	0.041	317	0.062	216	0.023	92	0.015	316	0.025	224	0.021	194
DCP 7	.149	1.566	0.783	39	0.335	346	0.101	267	0.051	265	0.058	191	0.020	145	0.031	134	0.016	80	0.008	27
DCP 8	.200	1.295	0.698	41	0.239	343	0.070	268	0.037	236	0.037	179	0.017	129	0.020	105	0.007	6	0.007	160
DCP 9	.250	1.148	0.661	34	0.246	318	0.086	232	0.068	175	0.052	120	0.032	59	0.023	19	0.015	335	0.016	299
DCP10	.300	1.015	0.614	32	0.206	304	0.078	217	0.068	156	0.047	91	0.034	37	0.026	1	0.024	291	0.020	231
DCP11	.399	0.854	0.555	35	0.166	297	0.067	215	0.077	153	0.042	82	0.035	37	0.030	336	0.029	255	0.023	206
DCP12	.501	0.663	0.466	36	0.145	279	0.061	189	0.080	121	0.053	28	0.036	346	0.039	273	0.031	197	0.018	139
DCP13	.600	0.530	0.386	37	0.133	261	0.066	154	0.073	94	0.048	353	0.037	325	0.036	251	0.045	168	0.028	71
DCP14	.701	0.446	0.284	42	0.121	236	0.069	115	0.065	62	0.046	304	0.022	297	0.037	206	0.031	110	0.019	12
DCP15	.900	0.197	0.217	28	0.124	219	0.069	101	0.050	51	0.038	303	0.024	267	0.033	176	0.025	82	0.009	2
DCP16	.900	0.019	0.138	16	0.079	221	0.039	118	0.043	28	0.030	277	0.021	211	0.018	135	0.015	73	0.010	297
DCP17	.969	-0.038	0.062	5	0.038	232	0.027	137	0.028	48	0.019	292	0.015	231	0.018	170	0.018	63	0.004	341

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	53.93	0.200	0.409	5.47	0.0	12.28	12085.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
137.4 (450.8)	49561. (1035.1)	0.65E 07	-0.227	1.688	17.48	-0.00042	0.477	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.278	5.470	0	0.454	26	0.381	323	0.062	108	0.050	98	0.037	355	0.047	133	0.025	195	0.015	180
CN		0.979	0.497	43	0.091	358	0.071	294	0.040	188	0.020	124	0.013	60	0.010	29	0.007	289	0.003	173
CM		-0.041	0.086	196	0.047	77	0.028	36	0.021	312	0.007	252	0.006	241	0.007	171	0.005	94	0.003	7
DCP 1	.010	3.442	0.392	117	1.229	87	0.274	77	0.112	53	0.182	147	0.090	46	0.042	215	0.083	136	0.036	62
DCP 2	.020	3.256	0.667	90	0.890	81	0.279	50	0.104	43	0.140	90	0.125	41	0.031	49	0.082	127	0.065	69
DCP 3	.030	3.013	0.658	93	0.898	75	0.294	24	0.096	27	0.121	50	0.113	7	0.060	0	0.024	26	0.047	4
DCP 4	.049	2.810	0.791	73	0.567	54	0.132	25	0.101	8	0.051	37	0.066	343	0.010	47	0.014	30	0.018	354
DCP 5	.074	2.426	0.774	67	0.427	41	0.122	14	0.091	340	0.031	12	0.058	321	0.004	310	0.016	312	0.017	326
DCP 6	.099	2.178	0.768	63	0.342	35	0.150	17	0.108	317	0.020	344	0.061	310	0.020	245	0.015	271	0.015	322
DCP 7	.149	1.738	0.776	52	0.291	16	0.172	348	0.118	283	0.032	263	0.041	258	0.023	232	0.019	194	0.012	220
DCP 8	.200	1.446	0.711	54	0.252	23	0.186	337	0.096	260	0.030	273	0.020	236	0.027	273	0.029	201	0.006	194
DCP 9	.250	1.306	0.701	47	0.229	10	0.236	321	0.144	245	0.062	214	0.025	193	0.046	183	0.033	130	0.017	92
DCP10	.300	1.159	0.636	43	0.184	3	0.211	311	0.140	226	0.063	189	0.032	166	0.055	142	0.028	80	0.019	60
DCP11	.399	1.002	0.618	42	0.129	350	0.185	312	0.140	229	0.071	183	0.043	163	0.059	131	0.033	53	0.015	86
DCP12	.501	0.813	0.572	36	0.121	313	0.149	283	0.111	196	0.070	158	0.058	112	0.051	67	0.040	349	0.014	319
DCP13	.600	0.675	0.534	32	0.153	282	0.136	249	0.117	160	0.062	126	0.066	89	0.075	35	0.065	315	0.037	265
DCP14	.701	0.573	0.454	29	0.190	261	0.133	214	0.122	128	0.065	74	0.055	37	0.059	344	0.051	265	0.028	196
DCP15	.800	0.369	0.375	19	0.188	252	0.150	191	0.130	102	0.071	32	0.041	342	0.042	308	0.032	212	0.020	129
DCP16	.900	0.092	0.240	3	0.114	239	0.094	171	0.067	76	0.031	6	0.019	357	0.034	301	0.024	209	0.019	153
DCP17	.969	-0.006	0.102	2	0.050	253	0.042	176	0.038	77	0.026	6	0.006	338	0.018	265	0.003	80	0.006	202

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	53.73	0.201	0.406	5.44	0.0	15.08	12085.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.1 (446.6)	48809. (1019.4)	0.65E 07	-0.262	1.833	19.03	-0.00081	0.906	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.082	5.438	0	0.303	36	0.328	15	0.083	172	0.029	199	0.045	69	0.053	246	0.009	334	0.020	186
CN		1.063	0.526	55	0.076	37	0.081	358	0.067	283	0.019	199	0.010	211	0.016	201	0.011	118	0.005	307
CM		-0.059	0.115	197	0.034	124	0.031	97	0.022	50	0.007	317	0.005	22	0.006	331	0.007	248	0.005	171
DCP 1	.010	3.629	1.487	156	0.690	117	0.248	167	0.107	265	0.107	213	0.024	336	0.031	321	0.051	276	0.025	315
DCP 2	.020	3.385	1.025	132	0.562	109	0.223	132	0.099	188	0.166	202	0.060	188	0.080	279	0.054	284	0.049	314
DCP 3	.030	2.987	1.135	136	0.562	105	0.342	126	0.144	87	0.115	178	0.108	127	0.048	191	0.044	174	0.043	229
DCP 4	.049	2.865	0.985	105	0.250	84	0.251	103	0.069	44	0.029	155	0.050	128	0.005	188	0.022	220	0.042	223
DCP 5	.074	2.494	0.936	94	0.209	77	0.260	79	0.066	0	0.041	118	0.048	91	0.016	107	0.019	113	0.034	187
DCP 6	.099	2.240	0.874	88	0.184	87	0.288	69	0.070	344	0.026	117	0.045	104	0.009	82	0.016	171	0.040	178
DCP 7	.149	1.826	0.802	71	0.182	79	0.281	41	0.084	330	0.029	352	0.042	57	0.042	324	0.026	248	0.020	152
DCP 8	.200	1.566	0.767	68	0.203	71	0.251	35	0.105	346	0.032	324	0.043	11	0.036	301	0.016	259	0.013	240
DCP 9	.250	1.403	0.739	58	0.209	60	0.259	12	0.134	319	0.057	291	0.026	335	0.036	285	0.014	293	0.014	328
DCP10	.300	1.260	0.673	53	0.182	57	0.221	5	0.136	318	0.049	275	0.033	307	0.035	252	0.014	199	0.019	271
DCP11	.399	1.117	0.604	49	0.127	45	0.194	0	0.166	323	0.065	272	0.036	298	0.052	239	0.011	215	0.020	241
DCP12	.501	0.915	0.647	41	0.101	9	0.154	342	0.155	297	0.067	232	0.060	245	0.055	191	0.021	185	0.013	133
DCP13	.600	0.770	0.631	36	0.119	339	0.147	311	0.144	266	0.053	213	0.048	216	0.053	180	0.049	132	0.034	68
DCP14	.701	0.655	0.547	30	0.138	305	0.160	274	0.138	229	0.072	149	0.059	164	0.036	117	0.054	94	0.040	1
DCP15	.800	0.452	0.457	20	0.151	297	0.159	249	0.124	200	0.069	118	0.030	113	0.010	97	0.037	64	0.030	331
DCP16	.900	0.166	0.299	8	0.094	290	0.090	231	0.078	175	0.042	82	0.009	133	0.014	105	0.041	23	0.031	295
DCP17	.969	0.021	0.141	14	0.062	297	0.051	234	0.049	166	0.017	71	0.008	18	0.008	195	0.010	48	0.005	19

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.53	0.252	0.409	5.75	0.0	1.33	12031.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
138.4 (454.0)	49398. (1031.7)	0.65E 07	-0.10	0.592	6.95	-0.03366	0.757	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		1.000	5.750 0	0.478 354	0.148 227	0.096 129	0.035 267	0.043 47	0.068 156	0.014 40	0.016 167
CN		0.167	0.416 6	0.035 20	0.011 275	0.004 185	0.005 273	0.003 159	0.003 199	0.001 72	0.003 184
CM		-0.018	0.029 286	0.006 294	0.003 134	0.001 112	0.001 111	0.001 213	0.001 65	0.000 167	0.001 20
DCP 1	.010	-0.529	2.933 343	0.343 1	0.095 124	0.020 156	0.024 165	0.020 199	0.012 345	0.008 177	0.003 353
DCP 2	.020	-0.184	2.098 352	0.184 339	0.038 235	0.002 216	0.011 296	0.009 189	0.007 65	0.005 209	0.002 269
DCP 3	.030	0.099	1.792 351	0.124 330	0.028 217	0.017 134	0.020 249	0.004 295	0.010 294	0.008 71	0.001 274
DCP 4	.049	0.270	1.464 353	0.122 337	0.034 232	0.018 173	0.014 218	0.008 201	0.005 194	0.010 102	0.007 312
DCP 5	.074	0.404	1.188 354	0.100 345	0.030 228	0.021 161	0.004 188	0.005 136	0.004 54	0.011 34	0.004 5
DCP 6	.099	0.426	1.028 356	0.085 355	0.013 232	0.020 153	0.001 203	0.002 202	0.007 45	0.004 147	0.006 92
DCP 7	.149	0.309	0.773 358	0.072 0	0.012 254	0.016 149	0.004 296	0.004 285	0.006 216	0.005 218	0.011 215
DCP 8	.200	0.252	0.633 6	0.050 25	0.013 252	0.002 123	0.012 282	0.001 173	0.005 64	0.001 345	0.011 213
DCP 9	.250	0.335	0.550 4	0.057 13	0.012 266	0.005 207	0.008 274	0.006 117	0.007 135	0.004 118	0.005 123
DCP10	.300	0.232	0.466 6	0.050 14	0.016 271	0.006 168	0.007 294	0.001 95	0.003 144	0.002 255	0.006 69
DCP11	.399	0.208	0.382 20	0.040 40	0.018 297	0.005 191	0.006 269	0.002 223	0.005 184	0.011 151	0.007 114
DCP12	.501	0.158	0.303 26	0.034 49	0.017 287	0.005 287	0.011 277	0.005 232	0.005 133	0.004 9	0.003 124
DCP13	.600	0.170	0.244 34	0.030 70	0.013 296	0.009 274	0.007 299	0.006 257	0.003 63	0.007 346	0.000 292
DCP14	.701	0.215	0.177 37	0.023 76	0.010 283	0.003 248	0.003 262	0.004 84	0.002 48	0.005 344	0.006 231
DCP15	.800	0.109	0.117 47	0.017 100	0.012 315	0.002 324	0.003 146	0.005 19	0.005 47	0.002 340	0.006 212
DCP16	.900	-0.065	0.054 61	0.017 133	0.009 338	0.004 90	0.003 313	0.009 71	0.005 208	0.009 282	0.007 196
DCP17	.969	-0.036	0.029 183	0.003 138	0.008 294	0.005 243	0.001 210	0.005 323	0.007 308	0.006 190	0.005 235

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.72	0.259	0.406	5.93	0.0	2.44	12031.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
137.0 (449.6)	48718. (1017.5)	0.64E 07	-0.051	0.785	8.72	-0.03071	0.819	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.456	5.933 0	0.506 340	0.123 231	0.053 133	0.027 333	0.023 88	0.014 176	0.006 86	0.007 214
CN		0.370	0.412 5	0.035 11	0.008 283	0.001 116	0.003 317	0.005 160	0.002 163	0.001 61	0.000 139
CM		-0.011	0.035 295	0.006 279	0.002 151	0.001 187	0.001 178	0.001 8	0.001 30	0.000 325	0.000 352
DCP 1	.010	1.002	2.881 341	0.226 322	0.048 152	0.024 72	0.028 243	0.013 97	0.005 62	0.006 1	0.001 260
DCP 2	.020	0.893	2.248 349	0.171 332	0.026 235	0.009 106	0.016 270	0.012 148	0.003 84	0.005 41	0.006 307
DCP 3	.030	0.982	1.913 348	0.140 331	0.025 259	0.006 115	0.013 269	0.011 123	0.005 53	0.001 336	0.002 36
DCP 4	.049	1.025	1.584 350	0.129 329	0.023 238	0.013 161	0.005 254	0.007 99	0.007 196	0.004 289	0.005 1
DCP 5	.074	1.023	1.259 350	0.103 335	0.013 234	0.008 117	0.008 246	0.013 76	0.006 134	0.004 43	0.000 159
DCP 6	.099	0.948	1.067 353	0.093 347	0.018 263	0.009 142	0.005 257	0.009 72	0.004 69	0.001 279	0.005 34
DCP 7	.149	0.692	0.786 356	0.072 353	0.013 230	0.005 125	0.001 266	0.008 99	0.002 15	0.002 68	0.004 359
DCP 8	.200	0.562	0.651 4	0.058 5	0.011 278	0.006 239	0.005 316	0.013 208	0.013 154	0.005 139	0.004 163
DCP 9	.250	0.592	0.549 3	0.056 0	0.015 260	0.002 179	0.006 285	0.005 166	0.006 81	0.005 330	0.005 45
DCP10	.300	0.449	0.459 4	0.047 16	0.008 287	0.002 159	0.001 294	0.006 114	0.002 74	0.004 28	0.002 74
DCP11	.399	0.376	0.371 21	0.041 38	0.007 290	0.003 296	0.009 359	0.007 209	0.004 236	0.006 32	0.005 194
DCP12	.501	0.283	0.290 27	0.041 37	0.010 295	0.007 231	0.003 11	0.005 198	0.002 115	0.004 189	0.004 356
DCP13	.600	0.263	0.231 36	0.032 59	0.013 310	0.003 88	0.007 345	0.009 160	0.003 46	0.001 124	0.003 227
DCP14	.701	0.280	0.160 45	0.025 63	0.012 315	0.007 37	0.004 31	0.007 151	0.004 67	0.002 15	0.002 102
DCP15	.800	0.143	0.113 60	0.016 81	0.006 318	0.003 13	0.005 319	0.004 158	0.006 66	0.004 245	0.002 88
DCP16	.900	-0.070	0.050 87	0.015 124	0.005 287	0.001 335	0.008 192	0.013 217	0.006 134	0.007 125	0.005 197
DCP17	.969	-0.053	0.029 157	0.002 151	0.011 43	0.003 89	0.004 351	0.003 136	0.004 43	0.002 281	0.002 164

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	69.83	0.261	0.404	5.90	0.0	4.96	12031.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.3 (447.2)	48354. (1009.9)	0.64E 07	-0.044	1.027	11.01	-0.00077	0.886	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.956	5.904	0	0.498	343	0.096	208	0.022	127	0.001	157	0.022	105	0.016	40?	0.006	341	0.009	97
CN		0.613	0.406	6	0.342	12	0.037	273	0.033	261	0.003	238	0.004	248	0.002	5[illegible]	0.001	37	0.002	94
CM		-0.005	0.038	296	0.006	250	0.002	150	0.001	205	0.001	83	0.001	88	0.001	23[illegible]	0.000	351	0.001	272
DCP 1	.010	2.828	3.189	342	0.341	277	0.098	155	0.051	191	0.382	111	0.061	26	0.027	20[illegible]	0.009	343	0.014	198
DCP 2	.020	2.144	2.244	349	0.192	329	0.051	201	0.067	66	0.082	338	0.058	242	0.043	12[illegible]	0.048	49	0.014	60
DCP 3	.030	2.040	1.877	349	0.145	350	0.024	330	0.020	235	0.019	169	0.009	98	0.002	16[illegible]	0.007	327	0.004	166
DCP 4	.049	1.907	1.565	350	0.126	348	0.034	330	0.017	225	0.012	150	0.004	136	0.001	2[illegible]	0.003	355	0.001	230
DCP 5	.074	1.741	1.233	352	0.087	354	0.018	226	0.024	208	0.017	196	0.010	217	0.012	27[illegible]	0.005	20	0.008	25
DCP 6	.099	1.550	1.042	354	0.091	354	0.012	266	0.004	231	0.001	98	0.006	143	0.001	29[illegible]	0.001	70	0.001	54
DCP 7	.149	1.144	0.770	356	0.068	357	0.010	257	0.003	313	0.009	249	0.012	200	0.012	17[illegible]	0.004	87	0.009	259
DCP 8	.200	0.932	0.641	6	0.066	8	0.011	263	0.005	209	0.004	336	0.005	139	0.001	3[illegible]	0.003	299	0.003	229
DCP 9	.250	0.900	0.543	4	0.058	359	0.015	216	0.004	308	0.006	234	0.004	155	0.005	33[illegible]	0.006	283	0.002	293
DCP10	.300	0.713	0.449	7	0.056	11	0.010	230	0.004	139	0.005	180	0.005	292	0.003	33[illegible]	0.005	328	0.001	211
DCP11	.399	0.586	0.360	22	0.051	34	0.010	262	0.004	273	0.004	256	0.006	233	0.002	43[illegible]	0.006	20	0.007	95
DCP12	.501	0.441	0.290	33	0.045	37	0.007	330	0.003	22	0.006	265	0.010	239	0.007	44[illegible]	0.005	154	0.002	305
DCP13	.600	0.379	0.230	41	0.038	49	0.010	334	0.006	338	0.002	222	0.008	278	0.005	1[illegible]	0.004	200	0.006	51
DCP14	.701	0.355	0.164	54	0.034	44	0.008	281	0.002	49	0.005	209	0.009	302	0.008	8[illegible]	0.004	217	0.008	129
DCP15	.800	0.179	0.120	67	0.023	56	0.008	316	0.004	74	0.004	256	0.003	276	0.006	5[illegible]	0.005	143	0.010	84
DCP16	.900	-0.052	0.058	86	0.009	43	0.005	331	0.003	60	0.008	307	0.005	279	0.007	[illegible]	0.002	351	0.003	94
DCP17	.969	-0.062	0.024	153	0.008	18	0.005	33	0.003	13	0.005	221	0.007	172	0.004	47[illegible]	0.004	29	0.007	265

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	69.74	0.262	0.402	5.88	0.0	7.44	12031.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.4 (444.4)	47895. (1000.3)	0.64E 07	-0.046	1.292	13.32	-0.00386	0.976	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.439	5.883	0	0.579	345	0.089	159	0.026	165	0.022	164	0.033	106	0.017	21[illegible]	0.011	162	0.009	26
CN		0.778	0.451	20	0.058	320	0.010	86	0.012	263	0.008	182	0.005	75	0.008	23[illegible]	0.003	231	0.000	70
CM		-0.001	0.040	278	0.012	10	0.011	232	0.006	97	0.001	10	0.002	167	0.003	7[illegible]	0.001	276	0.000	172
DCP 1	.010	3.418	1.969	353	0.078	27	0.031	298	0.255	186	0.087	309	0.182	183	0.111	4[illegible]	0.032	228	0.059	76
DCP 2	.020	2.883	1.800	3	0.575	14	0.332	288	0.167	201	0.066	178	0.103	150	0.061	9[illegible]	0.064	43	0.060	11
DCP 3	.030	2.787	1.716	1	0.418	358	0.242	272	0.168	184	0.094	121	0.074	86	0.069	4[illegible]	0.068	319	0.053	252
DCP 4	.049	2.551	1.531	2	0.323	340	0.135	230	0.071	120	0.011	215	0.056	106	0.053	33[illegible]	0 043	262	0.014	176
DCP 5	.074	2.257	1.246	3	0.257	332	0.107	214	0.052	108	0.017	166	0.055	67	0.057	32[illegible]	0.043	226	0.012	123
DCP 6	.099	1.980	1.345	7	0.221	329	0.096	198	0.052	87	0.013	243	0.035	78	0.063	34[illegible]	0.031	226	0.007	159
DCP 7	.149	1.476	0.837	8	0.162	318	0.070	174	0.027	75	0.012	133	0.025	19	0.037	44[illegible]	0.021	151	0.008	90
DCP 8	.200	1.217	0.718	15	0.133	310	0.072	166	0.030	41	0.015	177	0.017	353	0.032	25[illegible]	0.019	179	0.008	87
DCP 9	.250	1.163	0.649	12	0.100	278	0.076	112	0.032	337	0.009	167	0.024	286	0.021	17[illegible]	0.019	34	0.007	316
DCP10	.300	0.920	0.541	14	0.069	267	0.059	89	0.040	309	0.018	174	0.010	209	0.010	44[illegible]	0.011	279	0.003	183
DCP11	.399	0.750	0.455	29	0.053	269	0.057	93	0.040	329	0.019	247	0.013	239	0.015	3[illegible]	0.010	4	0.009	220
DCP12	.501	0.553	0.364	37	0.032	262	0.051	72	0.044	287	0.013	172	0.004	91	0.011	23[illegible]	0.005	196	0.004	256
DCP13	.600	0.443	0.301	49	0.017	276	0.040	56	0.031	269	0.005	157	0.001	37	0.013	27[illegible]	0.005	211	0.003	284
DCP14	.701	0.371	0.260	65	0.016	279	0.040	46	0.033	257	0.007	124	0.008	38	0.019	40[illegible]	0.007	138	0.009	13
DCP15	.800	0.193	0.191	71	0.017	213	0.035	20	0.020	212	0.003	315	0.009	64	0.015	25[illegible]	0.002	68	0.004	261
DCP16	.900	-0.032	0.081	59	0.035	173	0.027	355	0.010	210	0.006	156	0.007	13	0.013	23[illegible]	0.002	91	0.006	73
DCP17	.969	-0.064	0.019	78	0.016	173	0.015	10	0.003	201	0.004	276	0.015	355	0.014	25[illegible]	0.004	282	0.004	112

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.56	0.262	0.402	5.78	0.0	9.92	12031.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	FDR	EXT DAMP
135.3 (443.9)	47837. (999.1)	0.64E 07	-0.156	1.515	15.91	-0.00028	0.314	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.918	5.780	0	0.775	347	0.117	126	0.035	159	0.042	171	0.019	61	0.019	184	0.014	179	0.011	54
CN		0.897	0.538	31	0.109	304	0.045	156	0.029	28	0.018	274	0.018	231	0.014	96	0.002	310	0.005	83
CM		-0.019	0.048	236	0.047	29	0.025	289	0.015	184	0.006	90	0.007	35	0.010	264	0.004	110	0.002	261
DCP 1	.010	3.801	1.268	17	1.043	44	0.434	340	0.071	15	0.126	342	0.036	345	0.103	330	0.101	281	0.071	215
DCP 2	.020	3.108	1.123	32	0.880	42	0.379	345	0.163	312	0.123	279	0.065	237	0.047	298	0.068	276	0.084	239
DCP 3	.030	2.814	1.014	42	0.907	31	0.356	317	0.074	297	0.173	279	0.152	208	0.043	156	0.052	195	0.074	137
DCP 4	.049	2.673	1.097	33	0.624	15	0.158	330	0.056	311	0.123	244	0.069	165	0.026	264	0.070	163	0.052	92
DCP 5	.074	2.355	1.007	37	0.562	2	0.149	273	0.051	276	0.114	212	0.063	143	0.025	190	0.072	104	0.052	14
DCP 6	.099	2.101	0.978	37	0.482	351	0.131	250	0.046	275	0.111	199	0.059	125	0.018	140	0.047	77	0.024	7
DCP 7	.149	1.633	0.891	31	0.347	329	0.103	214	0.049	239	0.071	138	0.026	34	0.006	140	0.028	21	0.011	247
DCP 8	.200	1.378	0.845	34	0.301	324	0.108	217	0.061	198	0.066	134	0.033	47	0.031	23	0.023	323	0.016	261
DCP 9	.250	1.319	0.806	27	0.273	299	0.116	189	0.081	144	0.070	58	0.033	333	0.030	304	0.027	232	0.019	180
DCP10	.300	1.093	0.741	24	0.245	285	0.116	183	0.085	125	0.061	37	0.037	334	0.045	278	0.022	170	0.004	122
DCP11	.399	0.913	0.642	32	0.209	282	0.136	183	0.103	102	0.063	10	0.042	320	0.035	253	0.035	146	0.012	60
DCP12	.501	0.693	0.533	32	0.174	257	0.135	152	0.105	58	0.072	325	0.063	269	0.058	175	0.049	72	0.017	352
DCP13	.600	0.555	0.433	35	0.156	236	0.124	126	0.101	26	0.059	293	0.066	245	0.077	164	0.041	10	0.007	27
DCP14	.701	0.464	0.339	37	0.157	213	0.098	73	0.089	357	0.057	256	0.051	208	0.063	96	0.047	314	0.015	177
DCP15	.800	0.283	0.236	23	0.161	189	0.098	73	0.079	329	0.063	221	0.064	179	0.061	55	0.038	263	0.014	107
DCP16	.900	0.014	0.141	10	0.104	188	0.062	72	0.073	316	0.037	205	0.035	133	0.041	13	0.032	227	0.024	65
DCP17	.969	-0.037	0.050	356	0.044	202	0.036	84	0.036	329	0.016	217	0.015	169	0.027	64	0.019	264	0.006	105

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.60	0.252	0.409	5.66	0.0	12.39	12033.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	FDR	EXT DAMP
138.5 (454.3)	49527. (1034.4)	0.65E 07	-0.259	1.754	18.37	0.00024	-0.278	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.387	5.656	0	0.853	356	0.120	162	0.042	131	0.042	191	0.029	29	0.016	224	0.014	146	0.004	177
CN		1.055	0.541	35	0.104	332	0.045	214	0.015	116	0.011	134	0.006	23	0.015	254	0.003	142	0.007	4
CM		-0.057	0.105	183	0.066	48	0.030	331	0.012	224	0.003	269	0.010	171	0.011	52	0.004	292	0.002	201
DCP 1	.010	3.989	0.694	141	1.514	63	0.137	7	0.204	85	0.363	42	0.356	212	0.099	110	0.050	111	0.030	107
DCP 2	.020	3.256	0.752	108	1.111	64	0.261	25	0.133	87	0.170	34	0.062	323	0.056	144	0.051	72	0.042	100
DCP 3	.030	3.069	0.741	96	0.950	54	0.161	7	0.148	72	0.145	17	0.090	342	0.065	6	0.047	352	0.039	329
DCP 4	.049	2.927	0.709	66	0.572	46	0.148	57	0.142	22	0.072	339	0.058	337	0.027	352	0.034	322	0.022	313
DCP 5	.074	2.250	0.763	60	0.485	32	0.120	25	0.100	337	0.044	295	0.047	314	0.016	344	0.036	292	0.035	263
DCP 6	.099	2.325	0.789	59	0.452	23	0.121	7	0.113	317	0.347	263	0.331	301	0.022	259	0.035	221	0.013	331
DCP 7	.149	1.834	0.827	50	0.402	4	0.119	311	0.095	264	0.051	229	0.025	210	0.034	166	0.018	171	0.013	202
DCP 8	.200	1.560	0.813	51	0.391	5	0.174	301	0.105	236	0.026	233	0.045	226	0.039	196	0.005	190	0.015	140
DCP 9	.250	1.384	0.789	43	0.363	350	0.223	276	0.125	204	0.054	213	0.369	157	0.057	148	0.017	37	0.021	59
DCP10	.300	1.229	0.744	38	0.313	337	0.219	260	0.138	181	0.054	169	0.073	120	0.053	94	0.020	310	0.024	27
DCP11	.399	1.072	0.705	28	0.232	328	0.198	257	0.118	182	0.072	173	0.095	100	0.053	56	0.028	322	0.031	342
DCP12	.501	0.889	0.667	29	0.230	288	0.157	223	0.091	153	0.082	129	0.111	53	0.083	314	0.028	256	0.020	276
DCP13	.600	0.779	0.621	21	0.243	253	0.157	181	0.088	107	0.078	91	0.130	13	0.110	264	0.049	201	0.022	164
DCP14	.701	0.662	0.529	12	0.289	228	0.187	148	0.120	56	0.052	32	0.130	329	0.096	234	0.051	117	0.012	73
DCP15	.800	0.447	0.438	2	0.279	213	0.180	125	0.132	23	0.047	315	0.053	273	0.053	184	0.038	69	0.022	21
DCP16	.900	0.126	0.276	347	0.171	196	0.120	95	0.071	328	0.010	321	0.037	279	0.054	176	0.028	64	0.021	332
DCP17	.969	0.031	0.148	343	0.096	203	0.065	95	0.062	340	0.023	230	0.037	8	0.011	252	0.014	195	0.016	96

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.06	0.257	0.405	5.63	0.0	14.95	12033.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
136.6 (448.2)	48527. (1013.5)	0.64E 07	-0.304	1.984	19.94	-0.00037	0.375	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.947	5.632	0	0.695	0	0.203	235	0.027	218	0.042	196	0.031	23	0.065	264	0.006	173	0.012	242
CN		1.162	0.587	39	0.132	11	0.059	282	0.029	227	0.023	212	0.024	109	0.011	273	0.008	141	0.011	92
CM		-0.076	0.145	186	0.058	85	0.034	16	0.003	295	0.013	18	0.016	263	0.009	54	0.001	0	0.002	258
DCP 1	.010	4.134	1.654	160	1.029	79	0.269	110	0.193	182	0.102	79	0.177	293	0.081	204	0.054	307	0.101	259
DCP 2	.020	3.384	1.069	141	0.934	91	.211	83	0.263	157	0.175	125	0.145	265	0.132	224	0.027	298	0.081	288
DCP 3	.030	3.140	1.349	130	0.759	74	0.224	105	0.130	132	0.212	137	0.182	95	0.138	222	0.067	131	0.053	194
DCP 4	.049	3.068	0.767	92	0.457	76	0.275	77	0.058	88	0.063	82	0.011	82	0.085	195	0.076	167	0.059	159
DCP 5	.074	2.377	0.812	77	0.385	64	0.223	55	0.073	94	0.103	43	0.038	19	0.027	174	0.062	115	0.045	82
DCP 6	.099	2.471	0.832	70	0.386	55	0.204	26	0.085	81	0.101	4	0.042	354	0.016	448	0.021	63	0.014	118
DCP 7	.149	1.957	0.827	60	0.399	45	0.275	348	0.045	270	0.053	0	0.075	319	0.035	422	0.008	246	0.018	61
DCP 8	.200	1.672	0.813	61	0.448	49	0.300	343	0.092	283	0.156	352	0.181	320	0.034	492	0.014	31	0.004	120
DCP 9	.250	1.517	0.792	50	0.434	33	0.306	319	0.090	273	0.061	304	0.084	249	0.011	137	0.032	272	0.014	176
DCP10	.300	1.355	0.754	44	0.378	22	0.290	305	0.116	256	0.082	259	0.078	235	0.017	166	0.027	218	0.022	132
DCP11	.399	1.209	0.785	41	0.298	16	0.254	307	0.151	271	0.098	248	0.123	198	0.033	183	0.036	164	0.042	109
DCP12	.501	1.028	0.795	30	0.211	338	0.206	269	0.120	241	0.115	216	0.143	152	0.042	86	0.039	91	0.047	57
DCP13	.600	0.903	0.801	23	0.246	293	0.188	239	0.088	209	0.107	186	0.138	137	0.042	4	0.041	63	0.047	11
DCP14	.701	0.767	0.719	15	0.278	268	0.223	193	0.091	151	0.081	126	0.133	55	0.073	316	0.015	327	0.036	287
DCP15	.800	0.525	0.583	4	0.266	248	0.216	166	0.106	83	0.020	46	0.072	31	0.058	69	0.017	200	0.018	170
DCP16	.900	0.177	0.337	352	0.148	227	0.123	128	0.058	33	0.017	198	0.059	29	0.035	284	0.019	190	0.027	98
DCP17	.969	0.051	0.175	353	0.096	235	0.086	125	0.063	25	0.037	260	0.034	97	0.033	334	0.031	289	0.033	172

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.04	0.261	0.399	5.63	0.0	17.31	12033.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.6 (441.5)	47320. (988.3)	0.64E 07	-0.333	2.077	21.37	-0.00031	0.354	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.307	5.633	0	0.498	7	0.227	233	0.026	246	0.039	165	0.031	29	0.021	268	0.003	337	0.008	208
CN		1.200	0.580	42	0.193	33	0.091	306	0.016	256	0.017	240	0.017	225	0.005	304	0.004	99	0.004	313
CM		-0.091	0.146	187	0.061	136	0.038	66	0.005	326	0.009	44	0.009	351	0.006	234	0.003	248	0.001	84
DCP 1	.010	3.839	2.086	158	0.490	117	0.137	156	0.188	181	0.093	351	0.075	52	0.065	344	0.047	50	0.065	356
DCP 2	.020	3.210	1.351	144	0.441	110	0.195	179	0.228	188	0.107	225	0.016	303	0.033	316	0.033	60	0.052	27
DCP 3	.030	2.925	1.328	130	0.422	114	0.250	121	0.230	204	0.104	181	0.111	214	0.041	254	0.046	264	0.041	297
DCP 4	.049	3.055	0.802	97	0.425	124	0.228	97	0.102	151	0.086	156	0.021	132	0.061	496	0.041	293	0.026	277
DCP 5	.074	2.399	0.806	78	0.397	113	0.190	66	0.082	114	0.095	126	0.036	32	0.072	421	0.023	227	0.047	339
DCP 6	.099	2.510	0.838	69	0.365	100	0.146	54	0.085	87	0.068	114	0.030	14	0.052	193	0.003	60	0.018	12
DCP 7	.149	1.990	0.812	62	0.483	79	0.217	1	0.034	31	0.057	73	0.019	28	0.049	334	0.012	193	0.013	136
DCP 8	.200	1.708	0.807	66	0.519	71	0.226	9	0.059	4	0.086	75	0.041	21	0.022	348	0.019	75	0.003	249
DCP 9	.250	1.545	0.774	52	0.493	55	0.248	348	0.095	318	0.054	12	0.066	328	0.034	478	0.006	25	0.013	228
DCP10	.300	1.421	0.750	45	0.465	48	0.249	345	0.113	314	0.066	332	0.071	311	0.025	496	0.015	343	0.010	228
DCP11	.399	1.281	0.771	41	0.424	41	0.255	343	0.130	318	0.109	310	0.089	285	0.031	174	0.022	276	0.015	202
DCP12	.501	1.093	0.790	30	0.340	16	0.239	313	0.101	283	0.116	276	0.133	233	0.026	415	0.344	181	0.013	114
DCP13	.600	0.941	0.793	23	0.316	344	0.246	280	0.093	238	0.113	233	0.096	193	0.033	165	0.037	141	0.029	84
DCP14	.701	0.798	0.706	15	0.310	318	0.258	248	0.116	180	0.095	167	0.065	133	0.042	84	0.038	81	0.036	1
DCP15	.800	0.591	0.571	7	0.275	292	0.211	212	0.103	132	0.053	133	0.037	110	0.031	11	0.012	94	0.018	297
DCP16	.900	0.243	0.321	1	0.144	272	0.127	185	0.075	64	0.018	186	0.040	120	0.044	15	0.039	344	0.037	219
DCP17	.969	0.092	0.183	2	0.099	265	0.097	176	0.069	72	0.027	319	0.017	195	0.024	54	0.029	27	0.022	293

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.05	0.263	0.396	5.72	0.0	19.88	12093.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.4 (437.7)	46631. (973.9)	0.63E 07	-0.347	2.039	23.08	-0.00128	1.422	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.885	5.721	0	0.346	355	0.157	299	0.016	241	0.009	159	0.032	44	0.047	4..	0.001	55	0.002	225
CN		1.222	0.551	48	0.167	69	0.117	357	0.023	315	0.014	7	0.013	298	0.006	2..	0.006	95	0.008	63
CM		-0.113	0.140	202	0.050	183	0.045	131	0.008	54	0.009	155	0.013	74	0.007	..	0.002	0	0.003	199
DCP 1	.010	0.455	2.383	169	0.328	226	0.119	197	0.171	323	0.121	142	0.028	71	0.095	1..	0.042	202	0.047	170
DCP 2	.020	2.903	1.279	155	0.360	190	0.159	208	0.270	301	0.142	286	0.045	0	0.034	1..	0.021	261	0.025	130
DCP 3	.030	2.693	1.110	139	0.479	191	0.075	162	0.217	260	0.140	288	0.048	1	0.056	..	0.039	53	0.032	113
DCP 4	.049	2.847	0.746	133	0.522	187	0.120	130	0.065	171	0.099	275	0.055	237	0.045	..	0.015	75	0.018	119
DCP 5	.074	2.279	0.724	73	0.442	154	0.095	157	0.091	96	0.093	222	0.030	312	0.044	4..	0.010	72	0.056	132
DCP 6	.099	2.425	0.783	58	0.366	147	0.114	127	0.081	36	0.088	226	0.024	156	0.020	..	0.029	62	0.036	97
DCP 7	.149	1.924	0.682	61	0.480	47	0.129	48	0.036	5	0.078	146	0.062	115	0.069	1..	0.012	54	0.023	37
DCP 8	.200	1.670	0.635	65	0.425	99	0.210	71	0.039	11	0.068	168	0.040	140	0.034	4..	0.017	85	0.020	112
DCP 9	.250	1.558	0.662	53	0.415	82	0.259	68	0.055	7	0.076	99	0.041	73	0.089	4.	0.011	86	0.026	48
DCP10	.300	1.458	0.656	49	0.382	77	0.289	61	0.069	12	0.091	77	0.050	59	0.018	2.	0.018	128	0.001	5
DCP11	.349	1.357	0.704	47	0.333	74	0.295	60	0.079	22	0.100	61	0.065	53	0.017	4.	0.031	99	0.012	7
DCP12	.501	1.177	0.731	38	0.276	48	0.264	4	0.083	3	0.136	15	0.076	351	0.032	3..	0.026	49	0.013	280
DCP13	.600	1.028	0.742	33	0.259	25	0.281	336	0.073	313	0.089	341	0.079	298	0.044	4..	0.037	326	0.003	112
DCP14	.701	0.876	0.689	28	0.253	1	0.294	308	0.102	253	0.068	282	0.077	249	0.041	4..	0.038	262	0.037	194
DCP15	.800	0.670	0.570	24	0.187	346	0.236	290	0.099	224	0.058	236	0.053	212	0.032	1..	0.019	226	0.036	21
DCP16	.900	0.287	0.326	22	0.084	321	0.135	249	0.047	151	0.023	247	0.057	212	0.053	1..	0.048	110	0.040	9
DCP17	.969	0.103	0.189	27	0.069	294	0.387	229	0.052	131	0.031	33	0.031	287	0.045	4..	0.037	189	0.039	83

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	88.37	0.336	0.395	6.68	0.0	-0.00	12089.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.7 (438.7)	17266. (360.6)	0.23E 07	-0.069	0.657	7.86	-0.00078	0.887	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.001	6.678	0	1.228	301	0.090	218	0.090	95	0.051	353	0.015	55	0.036	353	0.010	228	0.008	156
CN		0.112	0.468	14	0.077	298	0.011	308	0.005	267	0.005	262	0.003	313	0.005	11	0.005	216	0.002	11
CM		-0.016	0.055	291	0.007	98	0.003	130	0.002	42	0.002	26	0.001	177	0.003	196	0.001	3	0.000	237
DCP 1	.010	-0.767	3.395	341	0.283	262	0.032	311	0.027	6	0.031	228	0.011	78	0.014	199	0.015	321	0.017	111
DCP 2	.020	-0.299	2.342	352	0.321	267	0.008	10	0.036	198	0.047	282	0.007	353	0.027	228	0.010	11	0.012	132
DCP 3	.030	-0.099	2.069	351	0.260	267	0.013	291	0.002	356	0.010	292	0.003	199	0.014	239	0.007	79	0.002	250
DCP 4	.049	0.158	1.722	353	0.205	274	0.016	300	0.010	243	0.004	311	0.006	317	0.012	130	0.002	337	0.008	9
DCP 5	.074	0.286	1.417	354	0.169	284	0.020	294	0.008	153	0.007	350	0.005	312	0.016	139	0.003	334	0.005	219
DCP 6	.099	0.330	1.194	357	0.130	290	0.013	274	0.011	167	0.014	7	0.011	290	0.022	190	0.002	191	0.003	45
DCP 7	.149	0.245	0.886	0	0.108	305	0.021	7	..	188	0.015	265	0.008	343	0.007	126	0.005	221	0.010	273
DCP 8	.200	0.196	0.732	13	0.091	339	0.018			70	0.001	80	0.010	308	0.012	324	0.002	125	0.009	68
DCP 9	.250	0.151	0.654	8	0.136	278	0.003	4..		4	0.011	301	0.007	151	0.001	34	0.008	125	0.002	131
DCP10	.300	0.164	0.550	11	0.096	291	0.017	306			0.016	312	0.006	196	0.007	107	0.014	181	0.014	287
DCP11	.349	0.138	0.445	32	0.096	305	0.010	275			0.009	328	0.015	250	0.006	348	0.016	221	0.008	50
DCP12	.501	0.107	0.371	41	0.074	314	0.009	322	0.0..		0.007	276	0.016	333	0.015	289	0.006	156	0.005	342
DCP13	.600	0.138	0.311	54	0.063	304	0.016	322	0.022	4..	0.005	92	0.004	337	0.013	5	0.021	222	0.006	31
DCP14	.701	0.206	0.252	58	0.043	313	0.017	293	0.002	132	0.008	143	0.013	96	0.025	26	0.006	335	0.008	38
DCP15	.800	0.102	0.198	76	0.016	244	0.010	269	0.017	161	0.013	172	0.006	36	0.022	10	0.010	216	0.005	273
DCP16	.900	-0.093	0.108	102	0.059	245	0.012	7	0.014	163	0.024	233	0.008	230	0.003	174	0.007	359	0.012	206
DCP17	.969	-0.050	0.050	157	0.061	234	0.016	300	0.022	332	0.009	264	0.012	348	0.011	109	0.004	293	0.017	78

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	88.56	0.338	0.395	6.67	0.0	2.46	12089.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.5 (438.1)	17294. (361.2)	0.235 07	-0.069	0.883	10.29	-0.96085	0.962	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.456	6.670	0	1.226	302	0.065	211	0.079	102	0.059	352	0.020	84	0.053	359	0.022	224	0.007	181
CN		0.361	0.461	15	0.067	316	0.003	40	0.010	238	0.002	266	0.002	271	0.001	160	0.004	168	0.003	29
CM		-0.009	0.057	295	0.010	218	0.001	267	0.003	67	0.001	12	0.001	354	0.002	164	0.002	341	0.001	295
PCP 1	.010	0.992	3.224	341	0.378	251	0.046	99	0.045	355	0.034	232	0.023	199	0.048	80	0.025	350	0.004	249
PCP 2	.020	0.955	2.614	351	0.413	268	0.090	169	0.064	75	0.053	325	0.041	280	0.028	166	0.021	119	0.015	44
PCP 3	.030	0.947	2.100	350	0.228	276	0.046	314	0.037	227	0.011	173	0.004	98	0.023	167	0.015	320	0.021	260
PCP 4	.049	1.056	1.788	353	0.261	280	0.007	67	0.023	180	0.009	128	0.039	350	0.014	81	0.0	346	0.021	319
PCP 5	.074	1.010	1.430	354	0.199	282	0.004	233	0.008	177	0.001	316	0.005	296	0.019	99	0.	355	0.009	288
PCP 6	.099	0.938	1.194	357	0.159	294	0.013	313	0.023	161	0.011	270	0.004	333	0.015	133	0.01	11	0.021	324
PCP 7	.149	0.784	0.902	1	0.117	310	0.006	342	0.012	270	0.016	341	0.011	16	0.023	155	0.002	103	0.011	280
PCP 8	.200	0.676	0.729	13	0.113	32	0.005	351	0.010	154	0.018	335	0.011	287	0.007	131	0.007	215	0.004	7
PCP 9	.250	0.487	0.631	12	0.115	90	0.012	103	0.015	297	0.001	313	0.007	357	0.003	197	0.008	198	0.013	284
PCP10	.300	0.446	0.541	14	0.091	358	0.012	146	0.011	219	0.004	197	0.005	191	0.012	168	0.004	263	0.010	38
PCP11	.399	0.366	0.438	34	0.090	344	0.008	33	0.015	269	0.012	23	0.013	304	0.020	265	0.005	147	0.016	49
PCP12	.501	0.280	0.362	43	0.074	350	0.006	3	0.018	241	0.007	322	0.005	191	0.011	278	0.013	179	0.006	105
PCP13	.600	0.257	0.307	56	0.058	354	0.012	135	0.018	259	0.008	202	0.012	323	0.010	309	0.016	175	0.011	64
PCP14	.701	0.282	0.241	64	0.038	6	0.004	144	0.019	231	0.018	183	0.008	145	0.015	356	0.004	181	0.015	206
PCP15	.800	0.145	0.180	86	0.049	34	0.010	212	0.014	215	0.004	196	0.006	209	0.008	59	0.013	90	0.006	58
PCP16	.900	-0.099	0.100	100	0.008	86	0.011	25	0.008	272	0.008	282	0.016	138	0.010	44	0.009	217	0.015	147
PCP17	.969	-0.060	0.041	154	0.018	265	0.017	87	0.013	358	0.009	142	0.007	282	0.002	182	0.004	50	0.010	279

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	88.28	0.338	0.393	6.66	0.0	4.05	12089.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.9 (435.9)	17093. (357.0)	0.235 07	-0.068	1.118	12.55	-0.00093	1.093	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.048	6.663	0	1.207	305	0.073	215	0.076	98	0.059	357	0.012	60	0.049	1	0.013	231	0.006	162
CN		0.601	0.665	17	0.072	335	0.003	62	0.006	282	0.010	321	0.001	151	0.003	268	0.002	155	0.002	273
CM		-0.101	0.058	295	0.021	214	0.003	210	0.000	72	0.002	152	0.001	196	0.001	136	0.002	342	0.000	149
PCP 1	.010	2.668	3.259	341	0.401	245	0.039	222	0.065	158	0.083	76	0.067	320	0.054	186	0.020	116	0.021	269
PCP 2	.020	2.691	2.691	353	0.434	266	0.104	181	0.091	118	0.0	152	0.069	61	0.043	297	0.041	183	0.051	32
PCP 3	.030	2.655	2.201	351	0.322	259	0.129	149	0.166	53	0.14	309	0.105	219	0.071	142	0.026	44	0.007	342
PCP 4	.049	1.926	1.775	356	0.223	277	0.020	230	0.032	77	0.047	312	0.058	213	0.047	107	0.046	351	0.039	243
PCP 5	.074	1.712	1.403	358	0.175	287	0.020	244	0.012	120	0.023	304	0.026	184	0.033	104	0.022	312	0.023	196
PCP 6	.099	1.627	1.141	0	0.143	299	0.018	288	0.019	85	0.010	265	0.013	195	0.028	127	0.013	306	0.011	201
PCP 7	.149	1.154	0.873	3	0.107	298	0.015	39	0.010	150	0.014	353	0.019	93	0.004	130	0.012	136	0.011	308
PCP 8	.200	0.956	0.718	15	0.100	17	0.010	351	0.008	339	0.001	215	0.017	148	0.013	294	0.008	0	0.012	135
PCP 9	.250	0.794	0.645	13	0.107	6	0.007	340	0.028	336	0.017	231	0.009	7	0.011	252	0.010	87	0.020	337
PCP10	.300	0.731	0.534	16	0.084	329	0.007	277	0.027	299	0.010	303	0.003	25	0.017	170	0.006	182	0.003	117
PCP11	.399	0.578	0.440	37	0.096	10	0.018	6	0.030	289	0.009	16	0.011	33	0.019	242	0.004	200	0.004	143
PCP12	.501	0.431	0.372	46	0.098	1	0.009	137	0.012	314	0.009	12	0.009	339	0.013	274	0.008	164	0.005	239
PCP13	.600	0.363	0.322	57	0.093	23	0.019	78	0.020	256	0.010	286	0.007	83	0.023	317	0.010	204	0.010	1
PCP14	.701	0.351	0.251	69	0.084	13	0.010	77	0.022	213	0.021	319	0.007	141	0.016	335	0.006	181	0.003	102
PCP15	.800	0.175	0.181	85	0.064	18	0.012	356	0.015	179	0.009	333	0.005	80	0.008	92	0.008	92	0.004	106
PCP16	.900	-0.082	0.104	93	0.050	30	0.013	20	0.006	127	0.008	265	0.014	286	0.015	325	0.004	183	0.005	273
PCP17	.969	-0.070	0.041	149	0.024	38	0.007	34	0.032	301	0.015	37	0.007	94	0.008	135	0.007	134	0.009	295

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	87.77	0.334	0.396	6.65	0.0	7.40	12089.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
133.6 (438.4)	17323. (361.8)	0.23E 07	-0.048	1.391	15.22	-0.00030	0.341	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.403	6.651 0	1.393 299	0.076 284	0.063 148	0.050 344	0.017 28	0.005 352	0.017 222	0.004 82
CN		0.762	0.582 20	0.048 254	0.040 6	0.032 224	0.006 61	0.007 74	0.007 291	0.002 262	0.008 145
CM		-0.009	0.029 253	0.041 99	0.021 178	0.006 31	0.002 215	0.000 332	0.002 93	0.001 236	0.003 338
OCP 1	.010		2.982	0.383 5	0.404 284	0.214 219	0.160 173	0.100 112	0.082 52	0.029 333	0.034 343
OCP 2	.020	2.553	1.990 10	0.888 8	0.443 304	0.259 260	0.216 218	0.111 154	0.093 192	0.065 89	0.039 354
OCP 3	.030	2.465	1.738 10	0.723 351	0.373 258	0.195 188	0.158 157	0.172 55	0.095 39	0.102 0	0.077 311
OCP 4	.049	2.207	1.463 17	0.610 346	0.193 262	0.131 223	0.137 142	0.116 43	0.045 18	0.089 320	0.086 244
OCP 5	.074	1.998	1.345 17	0.519 343	0.152 226	0.104 195	0.120 104	0.107 10	0.042 334	0.068 264	0.061 174
OCP 6	.099	1.811	1.252 19	0.463 322	0.145 200	0.092 189	0.140 81	0.109 348	0.026 284	0.070 242	0.052 159
OCP 7	.149	1.489	1.132 13	0.346 289	0.122 162	0.092 138	0.152 25	0.139 285	0.048 190	0.082 169	0.076 70
OCP 8	.200	1.262	1.025 18	0.262 278	0.128 143	0.076 108	0.151 17	0.095 273	0.086 209	0.059 47	0.074 59
OCP 9	.250	1.105	0.927 6	0.258 236	0.141 94	0.061 13	0.109 309	0.100 197	0.082 122	0.069 30	0.046 300
OCP10	.300	0.988	0.825 4	0.219 213	0.138 62	0.079 328	0.102 241	0.089 140	0.051 44	0.047 330	0.0 4 220
OCP11	.399	0.794	0.645 21	0.191 205	0.139 59	0.090 311	0.087 252	0.083 140	0.061 13	0.044 280	0.034 172
OCP12	.501	0.690	0.438 26	0.152 178	0.145 33	0.096 266	0.070 187	0.096 70	0.089 298	0.060 169	0.023 83
OCP13	.600	0.454	0.387 40	0.128 156	0.140 5	0.076 223	0.065 117	0.062 5	0.075 251	0.053 127	0.024 0
OCP14	.701	0.388	0.272 55	0.115 130	0.109 330	0.069 182	0.049 76	0.034 289	0.016 194	0.027 91	0.025 217
OCP15	.800	0.203	0.179 59	0.110 126	0.094 308	0.042 155	0.029 52	0.022 294	0.010 71	0.018 19	0.023 177
OCP16	.900	-0.054	0.069 28	0.075 119	0.044 297	0.033 136	0.027 3	0.010 197	0.021 92	0.026 286	0.023 114
OCP17	.969	-0.058	0.019 348	0.061 157	0.038 327	0.025 250	0.019 23	0.004 180	0. 16 134	0.006 320	0.012 168

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	88.48	0.332	0.401	6.63	0.0	9.89	12091.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
135.8 (445.5)	17950. (374.3)	0.24E 07	-0.174	1.604	16.00	0.00030	-0.342	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.888	6.625 0	1.609 302	0.091 212	0.082 169	0.036 339	0.013 35	0.004 1	0.022 203	0.003 104
CN		0.937	0.632 20	0.038 312	0.035 23	0.027 307	0.015 177	0.013 286	0.009 156	0.013 102	0.005 9
CM		-0.042	0.050 170	0.047 329	0.024 231	0.017 146	0.008 7	0.003 153	0.004 148	0.004 325	0.003 124
OCP 1	.010	2.994	1.261 44	0.497 13	0.296 347	0.244 298	0.091 265	0.114 269	0.073 192	0.046 179	0.034 104
OCP 2	.020	2.763	1.445 48	0.984 26	0.386 5	0.295 330	0.105 311	0.126 304	0.058 240	0.039 273	0.038 178
OCP 3	.030	2.614	1.304 41	0.799 10	0.294 332	0.302 283	0.162 234	0.166 229	0.161 185	0.089 160	0.105 138
OCP 4	.049	2.497	1.266 31	0.692 3	0.192 349	0.231 285	0.117 209	0.093 199	0.128 130	0.068 79	0.067 87
OCP 5	.074	2.271	1.240 28	0.425 344	0.181 332	0.249 255	0.191 170	0.086 156	0.123 96	0.069 22	0.047 35
OCP 6	.099	2.078	1.199 28	0.377 334	0.168 324	0.291 243	0.138 159	0.085 127	0.099 87	0.072 19	0.052 352
OCP 7	.149	1.652	1.187 25	0.381 306	0.109 270	0.202 217	0.147 122	0.127 76	0.083 20	0.056 338	0.061 275
OCP 8	.200	1.412	1.092 31	0.373 308	0.171 257	0.189 183	0.131 120	0.120 77	0.080 351	0.058 322	0.059 257
OCP 9	.250	1.292	1.019 19	0.300 299	0.176 217	0.197 127	0.122 43	0.106 344	0.092 290	0.056 289	0.062 169
OCP10	.300	1.162	0.916 15	0.240 281	0.186 197	0.203 99	0.148 10	0.131 295	0.110 206	0.066 130	0.072 87
OCP11	.399	1.042	0.810 17	0.147 245	0.124 170	0.199 87	0.148 359	0.152 285	0.126 209	0.098 118	0.053 59
OCP12	.501	0.834	0.662 11	0.101 191	0.126 107	0.194 35	0.154 280	0.122 213	0.102 123	0.072 39	0.057 301
OCP13	.600	0.694	0.495 11	0.210 169	0.101 88	0.187 344	0.144 234	0.078 152	0.099 56	0.078 300	0.040 204
OCP14	.701	0.552	0.337 10	0.220 140	0.102 39	0.169 303	0.116 183	0.072 68	0.072 327	0.066 211	0.031 94
OCP15	.800	0.318	0.188 3	0.195 127	0.146 23	0.146 278	0.112 135	0.063 353	0.039 309	0.059 148	0.037 349
OCP16	.900	0.017	0.112 338	0.195 95	0.097 356	0.099 247	0.055 109	0.021 314	0.018 249	0.031 73	0.029 296
OCP17	.969	-0.036	0.032 359	0.065 49	0.042 10	0.030 231	0.029 174	0.019 20	0.022 286	0.012 60	0.020 304

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	88.26	0.331	0.401	6.56	0.0	13.89	12001.2	20

V	Q	RN	CM(MINI	CM(MAX)	ALPHA.MMAX	AERO DAMP	TAR	EXT DAMP
135.7 (445.1)	17960. (375.1)	0.248 07	-0.257	1.954	21.37	0.00110	-1.270	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		13.889	6.564 0	1.815 304	0.198 212	0.082 190	0.042 15	0.011 329	0.077 355	0.022 237	0.004 98
CN		1.185	0.678 23	0.059 337	0.030 39	0.044 276	0.027 68	0.017 163	0.029 2	0.015 264	0.005 206
CM		-0.084	0.128 156	0.041 354	0.015 264	0.005 81	0.016 209	0.012 25	0.009 169	0.004 57	0.003 292
DCP 1	.010	3.174	1.848 105	0.510 43	0.414 80	0.099 130	0.107 90	0.074 95	0.076 40	0.045 75	0.023 253
DCP 2	.020	2.994	1.837 104	0.581 65	0.413 101	0.162 149	0.059 119	0.121 128	0.023 113	0.049 120	0.028 205
DCP 3	.030	2.797	1.687 91	0.532 46	0.420 57	0.176 64	0.198 47	0.135 79	0.087 64	0.098 83	0.038 64
DCP 4	.049	3.061	1.050 57	0.199 31	0.299 67	0.155 21	0.118 355	0.077 19	0.085 350	0.058 359	0.074 338
DCP 5	.074	2.808	1.074 42	0.112 24	0.324 45	0.197 343	0.129 312	0.064 2	0.110 314	0.054 286	0.055 284
DCP 6	.099	2.591	1.110 38	0.091 11	0.341 35	0.249 330	0.149 293	0.049 332	0.102 306	0.084 268	0.066 254
DCP 7	.149	1.927	1.188 48	0.448 344	0.178 320	0.184 323	0.188 265	0.068 224	0.072 238	0.060 287	0.070 189
DCP 8	.200	1.641	1.154 52	0.449 346	0.162 310	0.206 311	0.180 251	0.097 235	0.085 196	0.084 191	0.057 168
DCP 9	.250	1.480	1.075 37	0.468 342	0.216 280	0.224 253	0.191 184	0.113 147	0.100 104	0.061 72	0.065 20
DCP10	.300	1.362	0.995 30	0.402 335	0.253 257	0.189 219	0.175 146	0.123 103	0.084 52	0.064 16	0.048 320
DCP11	.399	1.310	0.954 21	0.282 337	0.259 250	0.135 209	0.232 146	0.148 81	0.100 45	0.094 0	0.081 309
DCP12	.501	1.164	0.995 4	0.157 247	0.133 202	0.164 170	0.284 79	0.142 339	0.081 347	0.143 266	0.097 188
DCP13	.600	1.011	0.855 354	0.277 298	0.167 126	0.070 119	0.267 41	0.188 280	0.016 249	0.079 281	0.077 121
DCP14	.701	0.770	0.621 347	0.284 175	0.212 91	0.097 358	0.148 340	0.148 210	0.030 149	0.053 124	0.040 21
DCP15	.800	0.500	0.428 336	0.246 164	0.219 68	0.143 321	0.057 296	0.094 171	0.069 354	0.028 277	0.023 101
DCP16	.900	0.175	0.295 317	0.169 108	0.125 8	0.045 288	0.077 284	0.076 127	0.033 292	0.010 126	0.015 14
DCP17	.969	0.027	0.104 313	0.110 88	0.093 359	0.029 145	0.054 340	0.042 185	0.021 308	0.008 3	0.026 216

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	87.93	0.333	0.398	6.56	0.0	14.90	12001.3	20

V	Q	RN	CM(MINI	CM(MAX)	ALPHA.MMAX	AERO DAMP	TAR	EXT DAMP
134.6 (441.6)	17653. (368.7)	0.248 07	-0.310	2.012	21.73	0.00118	-1.355	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		14.903	6.562 0	1.756 305	0.098 209	0.041 182	0.049 8	0.010 319	0.069 358	0.024 238	0.003 268
CN		1.255	0.689 25	0.026 36	0.037 81	0.074 277	0.034 92	0.022 170	0.019 38	0.006 299	0.010 206
CM		-0.100	0.145 158	0.053 353	0.020 271	0.019 59	0.022 230	0.010 19	0.006 188	0.007 81	0.003 107
DCP 1	.010	3.195	1.979 113	0.277 73	0.348 101	0.249 156	0.075 159	0.087 122	0.023 195	0.040 75	0.043 160
DCP 2	.020	3.054	1.937 113	0.369 99	0.357 125	0.292 175	0.090 227	0.102 155	0.071 292	0.021 155	0.059 212
DCP 3	.030	2.803	1.562 98	0.452 72	0.380 74	0.223 119	0.115 111	0.159 121	0.076 147	0.078 139	0.067 179
DCP 4	.049	3.144	1.095 69	0.129 61	0.252 79	0.191 78	0.073 15	0.129 84	0.074 59	0.078 65	0.051 76
DCP 5	.074	2.909	1.021 48	0.096 74	0.270 59	0.159 30	0.083 340	0.101 56	0.065 25	0.071 21	0.044 21
DCP 6	.099	2.674	1.067 42	0.062 69	0.298 48	0.200 6	0.084 326	0.092 39	0.083 1	0.058 350	0.048 353
DCP 7	.149	1.994	1.197 55	0.449 351	0.078 333	0.230 1	0.155 294	0.052 306	0.058 301	0.061 261	0.055 262
DCP 8	.200	1.711	1.154 55	0.421 355	0.110 338	0.217 340	0.163 290	0.084 255	0.070 246	0.058 239	0.070 286
DCP 9	.250	1.585	1.105 41	0.462 3	0.180 286	0.259 303	0.173 221	0.123 197	0.085 169	0.105 143	0.065 192
DCP10	.300	1.445	0.991 34	0.406 358	0.251 271	0.231 262	0.166 189	0.142 147	0.089 109	0.064 99	0.052 61
DCP11	.399	1.384	0.967 27	0.258 3	0.232 263	0.248 269	0.242 178	0.146 138	0.104 114	0.091 74	0.064 11
DCP12	.501	1.229	0.952 7	0.174 271	0.192 199	0.183 293	0.292 116	0.127 33	0.099 17	0.089 330	0.095 257
DCP13	.600	1.078	0.941 358	0.272 215	0.208 139	0.110 204	0.293 77	0.159 324	0.099 312	0.078 284	0.072 194
DCP14	.701	0.869	0.730 348	0.332 190	0.251 106	0.010 335	0.191 22	0.137 247	0.019 180	0.036 235	0.042 58
DCP15	.800	0.670	0.512 339	0.316 170	0.251 76	0.098 303	0.092 2	0.107 191	0.057 21	0.041 266	0.023 357
DCP16	.900	0.221	0.291 316	0.278 127	0.147 15	0.064 180	0.121 324	0.072 119	0.042 320	0.044 193	0.012 267
DCP17	.969	0.062	0.118 310	0.208 125	0.103 357	0.028 162	0.064 355	0.039 294	0.008 129	0.004 168	0.030 300

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.59	0.068	0.505	5.14	0.0	0.00	12039.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
169.3 (555.4)	74439. (1554.7)	0.79E 07	-0.037	0.653	5.00	-0.00076	1.032	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.003	5.142 0	0.213 9	0.037 259	0.006 117	0.028 351	0.035 136	0.019 274	0.046 325	0.005 248
CN		0.126	0.523 354	0.009 324	0.007 289	0.002 244	0.004 321	0.002 145	0.005 340	0.011 335	0.001 144
CM		-0.016	0.015 318	0.002 26	0.002 116	0.001 198	0.000 184	0.000 53	0.001 179	0.003 149	0.000 344
DCP 1	.010	-0.669	3.295 348	0.118 274	0.252 317	0.219 36	0.116 108	0.046 164	0.016 42	0.041 157	0.048 238
DCP 2	.020	-0.380	2.633 351	0.059 319	0.034 303	0.018 19	0.018 88	0.052 177	0.061 285	0.043 354	0.023 75
DCP 3	.030	-0.142	2.379 350	0.090 35	0.078 155	0.063 226	0.038 316	0.020 138	0.053 278	0.034 347	0.027 61
DCP 4	.049	0.149	1.965 350	0.065 20	0.081 145	0.072 217	0.055 296	0.024 38	0.008 20	0.008 342	0.012 54
DCP 5	.074	0.311	1.580 350	0.043 356	0.034 138	0.039 206	0.039 288	0.018 15	0.016 32	0.005 87	0.004 240
DCP 6	.099	0.388	1.312 351	0.031 334	0.002 71	0.018 205	0.018 288	0.006 35	0.009 358	0.004 48	0.005 225
DCP 7	.149	0.265	0.960 351	0.020 321	0.009 300	0.003 172	0.005 298	0.003 128	0.008 346	0.001 330	0.002 225
DCP 8	.200	0.209	0.784 354	0.018 320	0.012 316	0.002 50	0.002 340	0.005 167	0.007 342	0.006 357	0.003 128
DCP 9	.250	0.189	0.678 353	0.016 335	0.009 288	0.002 227	0.006 307	0.005 181	0.004 323	0.011 327	0.002 217
DCP10	.300	0.197	0.570 353	0.012 336	0.008 292	0.001 259	0.004 329	0.001 251	0.005 333	0.009 322	0.002 221
DCP11	.399	0.181	0.457 358	0.008 338	0.007 297	0.000 42	0.004 339	0.002 174	0.005 15	0.016 329	0.001 85
DCP12	.501	0.128	0.343 359	0.005 327	0.010 299	0.003 331	0.003 26	0.006 165	0.004 0	0.012 339	0.002 111
DCP13	.600	0.142	0.258 1	0.005 280	0.009 302	0.002 324	0.002 61	0.002 160	0.004 290	0.013 340	0.001 156
DCP14	.701	0.208	0.179 2	0.003 196	0.008 296	0.000 336	0.004 338	0.001 147	0.003 331	0.014 336	0.003 160
DCP15	.800	0.094	0.100 7	0.006 207	0.010 300	0.002 277	0.003 0	0.001 273	0.003 309	0.014 326	0.002 229
DCP16	.900	-0.091	0.019 40	0.013 230	0.008 278	0.004 333	0.004 314	0.000 284	0.007 359	0.012 320	0.003 341
DCP17	.969	-0.047	0.027 175	0.007 218	0.007 272	0.001 260	0.003 303	0.001 320	0.003 81	0.013 339	0.004 134

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.67	0.069	0.502	5.16	0.0	2.45	12039.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
167.8 (550.6)	73621. (1537.6)	0.79E 07	-0.027	0.929	7.69	-0.00075	1.008	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.447	5.157 0	0.228 9	0.091 263	0.006 214	0.020 17	0.018 55	0.029 188	0.065 179	0.005 305
CN		0.396	0.531 353	0.026 0	0.011 311	0.001 247	0.002 269	0.001 69	0.001 249	0.018 188	0.002 69
CM		-0.009	0.015 321	0.004 253	0.001 170	0.000 119	0.000 78	0.000 256	0.000 85	0.005 20	0.000 198
DCP 1	.010	1.132	3.595 348	0.165 311	0.130 145	0.011 144	0.022 184	0.038 28	0.032 305	0.041 175	0.014 91
DCP 2	.020	1.073	2.891 350	0.213 288	0.139 164	0.106 66	0.061 318	0.020 209	0.021 338	0.060 206	0.050 125
DCP 3	.030	1.140	2.438 350	0.162 288	0.098 163	0.119 60	0.120 321	0.103 228	0.077 130	0.029 63	0.007 54
DCP 4	.049	1.157	1.913 350	0.079 1	0.096 328	0.087 239	0.066 147	0.053 44	0.032 310	0.034 181	0.009 75
DCP 5	.074	1.135	1.598 350	0.069 332	0.022 303	0.015 236	0.009 154	0.003 184	0.004 304	0.019 162	0.003 101
DCP 6	.099	1.063	1.327 351	0.057 347	0.018 309	0.007 251	0.004 179	0.001 72	0.002 193	0.018 157	0.001 8
DCP 7	.149	0.756	0.970 351	0.042 358	0.013 302	0.005 242	0.002 198	0.001 103	0.002 136	0.014 156	0.002 340
DCP 8	.200	0.608	0.793 354	0.039 6	0.011 319	0.002 236	0.002 210	0.002 7	0.001 162	0.016 166	0.002 46
DCP 9	.250	0.530	0.677 353	0.035 15	0.011 314	0.002 265	0.001 208	0.000 133	0.001 340	0.018 181	0.002 84
DCP10	.300	0.486	0.564 353	0.032 17	0.010 319	0.002 250	0.002 272	0.001 112	0.002 130	0.014 173	0.002 26
DCP11	.399	0.410	0.452 357	0.027 27	0.007 347	0.001 263	0.002 293	0.001 28	0.002 231	0.023 196	0.003 34
DCP12	.501	0.300	0.345 358	0.021 27	0.005 325	0.002 308	0.003 320	0.000 81	0.003 273	0.017 202	0.002 98
DCP13	.600	0.273	0.261 0	0.018 32	0.006 314	0.002 209	0.002 293	0.003 62	0.001 201	0.020 200	0.001 84
DCP14	.701	0.298	0.174 1	0.020 42	0.002 332	0.002 323	0.001 268	0.002 17	0.000 199	0.018 196	0.001 103
DCP15	.800	0.139	0.099 5	0.013 54	0.004 359	0.001 171	0.001 245	0.003 89	0.001 295	0.019 197	0.003 300
DCP16	.900	-0.085	0.029 12	0.004 11	0.004 9	0.002 43	0.003 276	0.002 155	0.001 253	0.022 191	0.001 31
DCP17	.969	-0.059	0.021 183	0.003 348	0.001 298	0.002 100	0.003 149	0.002 43	0.002 355	0.017 201	0.002 77

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.80	0.070	0.499	5.17	0.0	4.93	12035.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
166.7 (547.0)	72893. (1522.4)	0.79E 07	-0.020	1.148	10.14	-0.00098	1.304	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.928	5.167	0	0.218	10	0.052	267	0.013	234	0.017	74	0.029	25	0.043	177	0.015	107	0.004	301
CN		0.643	0.481	357	0.063	13	0.023	260	0.012	114	0.008	337	0.005	230	0.003	135	0.002	71	0.003	58
CM		0.001	0.024	329	0.006	239	0.001	25	0.003	241	0.003	127	0.002	17	0.001	261	0.001	189	0.000	276
DCP 1	.010	2.656	3.018	349	0.359	39	0.298	324	0.178	224	0.039	184	0.036	269	0.020	204	0.045	181	0.037	95
DCP 2	.020	2.474	2.834	352	0.180	346	0.154	325	0.185	241	0.106	142	0.028	305	0.059	156	0.011	99	0.046	124
DCP 3	.030	2.436	2.599	352	0.221	309	0.049	291	0.120	249	0.121	158	0.033	55	0.060	146	0.072	51	0.017	312
DCP 4	.049	2.295	2.161	353	0.206	329	0.100	294	0.125	244	0.154	161	0.132	62	0.063	309	0.035	132	0.056	350
DCP 5	.074	1.874	1.459	355	0.253	4	0.164	263	0.098	148	0.041	60	0.024	83	0.053	17	0.054	287	0.024	227
DCP 6	.099	1.643	1.147	354	0.183	23	0.091	270	0.074	142	0.065	47	0.052	330	0.034	270	0.039	218	0.026	190
DCP 7	.149	1.191	0.841	354	0.112	28	0.034	285	0.021	104	0.021	6	0.018	285	0.012	216	0.012	170	0.009	72
DCP 8	.200	1.004	0.772	357	0.077	340	0.062	196	0.061	86	0.047	352	0.032	267	0.018	186	0.013	156	0.013	76
DCP 9	.250	0.881	0.674	355	0.058	316	0.066	163	0.066	54	0.055	314	0.036	223	0.022	147	0.018	84	0.017	20
DCP10	.300	0.768	0.537	356	0.052	344	0.039	172	0.044	59	0.038	310	0.026	213	0.018	126	0.013	41	0.009	333
DCP11	.399	0.618	0.401	1	0.052	21	0.011	221	0.017	63	0.018	302	0.012	184	0.007	82	0.004	18	0.002	73
DCP12	.501	0.446	0.284	5	0.057	33	0.016	281	0.008	99	0.010	302	0.009	191	0.006	94	0.004	14	0.000	268
DCP13	.600	0.369	0.195	10	0.063	38	0.027	287	0.011	143	0.007	354	0.006	208	0.006	73	0.004	336	0.002	128
DCP14	.701	0.348	0.103	23	0.068	43	0.028	288	0.012	144	0.008	0	0.006	232	0.004	105	0.003	16	0.002	67
DCP15	.800	0.164	0.056	37	0.044	46	0.014	278	0.008	102	0.009	315	0.007	218	0.002	185	0.003	356	0.003	131
DCP16	.900	-0.071	0.029	28	0.012	340	0.009	158	0.011	41	0.009	263	0.006	126	0.004	8	0.001	335	0.001	79
DCP17	.969	-0.065	0.005	149	0.013	260	0.007	159	0.006	45	0.005	293	0.002	164	0.002	256	0.004	53	0.002	31

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.38	0.069	0.498	5.14	0.0	7.39	12035.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
166.0 (544.6)	72366. (1511.4)	0.79E 07	-0.049	1.262	11.52	-0.00122	1.623	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.389	5.143	0	0.192	28	0.048	331	0.016	339	0.054	328	0.046	212	0.065	100	0.105	293	0.018	239
CN		0.801	0.297	10	0.154	45	0.054	330	0.023	285	0.022	230	0.017	153	0.012	56	0.025	324	0.004	317
CM		0.000	0.018	287	0.015	117	0.012	15	0.004	323	0.005	320	0.005	247	0.003	175	0.011	121	0.001	78
DCP 1	.010	3.545	1.634	347	1.077	70	0.430	352	0.105	349	0.083	309	0.039	273	0.030	149	0.102	40	0.009	256
DCP 2	.020	3.202	1.590	351	0.936	78	0.563	359	0.110	323	0.184	322	0.079	252	0.049	262	0.099	80	0.042	303
DCP 3	.030	3.086	1.530	350	0.733	81	0.511	7	0.142	322	0.207	325	0.121	255	0.094	286	0.062	157	0.040	308
DCP 4	.049	2.731	1.033	352	0.804	77	0.469	1	0.077	322	0.221	344	0.195	257	0.008	13	0.052	256	0.039	235
DCP 5	.074	2.253	0.733	7	0.535	55	0.197	5	0.159	328	0.092	274	0.085	252	0.044	178	0.016	332	0.060	194
DCP 6	.099	1.995	0.620	7	0.420	51	0.140	342	0.099	308	0.095	242	0.062	193	0.042	149	0.052	97	0.022	124
DCP 7	.149	1.495	0.528	7	0.293	44	0.126	330	0.084	276	0.076	216	0.060	160	0.043	100	0.043	70	0.016	54
DCP 8	.200	1.246	0.503	11	0.228	36	0.102	319	0.072	275	0.074	221	0.063	164	0.045	99	0.044	78	0.023	55
DCP 9	.250	1.111	0.484	11	0.195	19	0.095	295	0.067	243	0.071	193	0.064	130	0.048	72	0.039	353	0.034	359
DCP10	.300	0.961	0.387	11	0.153	21	0.061	298	0.045	257	0.058	198	0.054	126	0.039	56	0.035	331	0.022	347
DCP11	.399	0.772	0.296	18	0.125	28	0.043	294	0.024	256	0.036	203	0.035	127	0.026	53	0.047	325	0.013	337
DCP12	.501	0.562	0.208	24	0.100	30	0.029	277	0.008	222	0.017	189	0.021	101	0.017	23	0.042	312	0.010	266
DCP13	.600	0.446	0.141	37	0.090	30	0.024	261	0.005	149	0.011	183	0.018	88	0.014	10	0.040	303	0.006	266
DCP14	.701	0.391	0.086	69	0.074	29	0.022	217	0.014	86	0.004	193	0.013	69	0.013	338	0.038	297	0.004	212
DCP15	.800	0.205	0.071	55	0.042	350	0.026	197	0.011	110	0.010	141	0.015	43	0.011	330	0.036	299	0.002	241
DCP16	.900	-0.039	0.066	24	0.037	299	0.018	195	0.012	179	0.016	114	0.011	31	0.006	318	0.040	299	0.005	173
DCP17	.969	-0.059	0.024	20	0.027	2 5	0.007	196	0.007	199	0.007	113	0.004	63	0.003	309	0.035	308	0.002	171

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.77	0.071	0.493	5.02	0.0	9.88	12035.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
164.1 (538.4)	69857. (1459.0)	0.77E 07	-0.071	1.350	11.96	-0.00138	1.811	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.881	5.015	0	0.247	27	0.034	269	0.033	88	0.042	58	0.113	35	0.148	244	0.036	268	0.018	147
CN		0.932	0.176	47	0.132	52	0.046	81	0.040	18	0.019	350	0.018	307	0.016	240	0.014	287	0.010	185
CM		-0.010	0.034	218	0.027	100	0.002	172	0.012	94	0.004	60	0.007	64	0.005	19	0.002	87	0.004	332
DCP 1	.010	3.937	0.306	184	1.267	72	0.201	125	0.223	80	0.084	12	0.044	127	0.053	318	0.020	266	0.035	317
DCP 2	.020	3.552	0.104	215	1.294	79	0.144	137	0.367	80	0.104	82	0.059	113	0.077	28	0.045	213	0.064	327
DCP 3	.030	3.486	0.243	320	1.043	85	0.113	122	0.400	85	0.137	93	0.119	74	0.118	78	0.061	233	0.034	31
DCP 4	.049	3.017	0.150	161	0.866	79	0.192	152	0.377	82	0.076	168	0.241	74	0.060	171	0.074	67	0.069	133
DCP 5	.074	2.510	0.289	95	0.467	75	0.245	96	0.154	77	0.120	56	0.097	74	0.040	39	0.057	91	0.023	96
DCP 6	.099	2.231	0.231	77	0.366	65	0.147	87	0.115	41	0.093	20	0.068	0	0.039	345	0.044	0	0.042	353
DCP 7	.149	1.706	0.265	54	0.289	53	0.089	58	0.096	15	0.065	341	0.050	334	0.043	299	0.039	303	0.019	284
DCP 8	.200	1.435	0.301	49	0.251	54	0.110	52	0.108	14	0.078	351	0.068	334	0.053	301	0.049	310	0.031	277
DCP 9	.250	1.307	0.342	36	0.189	40	0.105	39	0.103	349	0.075	333	0.078	304	0.059	269	0.066	270	0.046	222
DCP10	.300	1.138	0.305	35	0.135	32	0.070	45	0.071	348	0.055	333	0.063	292	0.041	242	0.041	264	0.036	203
DCP11	.399	0.917	0.259	40	0.095	24	0.045	74	0.054	354	0.032	332	0.043	292	0.035	243	0.022	273	0.017	204
DCP12	.501	0.684	0.215	44	0.072	4	0.030	91	0.037	335	0.014	312	0.032	276	0.029	216	0.011	269	0.018	182
DCP13	.600	0.535	0.166	51	0.059	336	0.024	124	0.038	302	0.018	236	0.037	249	0.038	193	0.008	232	0.025	164
DCP14	.701	0.496	0.129	67	0.053	313	0.031	120	0.031	295	0.012	190	0.018	230	0.018	169	0.005	333	0.014	133
DCP15	.800	0.265	0.128	44	0.063	297	0.007	68	0.036	267	0.012	182	0.018	226	0.011	186	0.002	270	0.012	117
DCP16	.900	0.008	0.123	19	0.047	287	0.020	349	0.027	256	0.006	272	0.014	215	0.005	187	0.005	294	0.010	131
DCP17	.969	-0.045	0.058	17	0.022	293	0.015	349	0.011	286	0.008	286	0.009	229	0.005	248	0.005	307	0.007	121

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.070	0.503	4.95	0.0	12.38	12037.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
168.8 (553.9)	74109. (1547.8)	0.79E 07	-0.089	1.287	11.61	-0.00152	2.052	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.381	4.948	0	0.215	20	0.048	156	0.015	167	0.040	247	0.079	183	0.036	313	0.011	182	0.002	198
CN		0.984	0.166	89	0.030	103	0.050	122	0.030	145	0.013	121	0.018	132	0.006	21	0.002	284	0.007	152
CM		-0.023	0.058	200	0.008	108	0.014	181	0.005	239	0.006	177	0.006	247	0.003	179	0.003	147	0.001	354
DCP 1	.010	4.058	1.217	171	0.122	85	0.405	164	0.067	170	0.096	150	0.064	216	0.044	110	0.043	259	0.036	95
DCP 2	.020	3.766	1.229	172	0.105	92	0.458	170	0.082	216	0.115	172	0.092	238	0.042	142	0.061	273	0.023	134
DCP 3	.030	3.605	1.102	178	0.179	104	0.373	175	0.118	236	0.108	191	0.083	255	0.030	215	0.067	284	0.004	174
DCP 4	.049	3.102	1.121	173	0.037	238	0.385	172	0.242	253	0.029	172	0.105	255	0.058	356	0.040	271	0.041	20
DCP 5	.074	2.472	0.538	138	0.259	133	0.291	172	0.176	211	0.114	231	0.099	268	0.106	348	0.077	63	0.059	109
DCP 6	.099	2.232	0.402	128	0.117	127	0.178	146	0.124	160	0.119	173	0.073	195	0.040	232	0.025	241	0.020	339
DCP 7	.149	1.747	0.303	103	0.092	92	0.135	118	0.072	133	0.063	122	0.053	146	0.016	159	0.026	156	0.018	237
DCP 8	.200	1.464	0.278	103	0.152	103	0.128	117	0.091	138	0.059	135	0.065	157	0.021	175	0.039	179	0.027	205
DCP 9	.250	1.342	0.281	86	0.148	87	0.127	99	0.093	112	0.071	102	0.065	124	0.033	125	0.040	164	0.034	156
DCP10	.300	1.166	0.242	73	0.094	88	0.089	92	0.067	109	0.046	102	0.050	109	0.022	126	0.025	130	0.029	150
DCP11	.399	0.982	0.238	58	0.037	73	0.045	72	0.038	132	0.023	69	0.032	113	0.009	91	0.013	88	0.013	196
DCP12	.501	0.764	0.228	49	0.011	317	0.032	54	0.029	127	0.018	29	0.030	103	0.014	31	0.011	45	0.006	146
DCP13	.600	0.617	0.204	47	0.033	267	0.031	21	0.017	140	0.021	348	0.025	92	0.019	4	0.016	338	0.006	165
DCP14	.701	0.508	0.173	45	0.056	258	0.030	19	0.013	113	0.025	335	0.023	78	0.020	334	0.016	331	0.002	197
DCP15	.800	0.321	0.182	30	0.031	271	0.038	8	0.019	38	0.018	326	0.015	46	0.012	340	0.020	318	0.002	262
DCP16	.900	0.061	0.165	15	0.017	350	0.026	348	0.018	28	0.006	29	0.016	11	0.011	343	0.019	290	0.002	93
DCP17	.969	-0.019	0.080	14	0.011	11	0.015	22	0.007	53	0.008	60	0.006	93	0.008	36	0.016	304	0.002	51

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.070	0.500	4.96	0.0	17.33	12037.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
167.5 (549.4)	73266. (1530.2)	0.79E 07	-0.123	1.127	19.59	-0.00212	2.842	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.335	4.959	0	0.210	5	0.025	267	0.010	105	0.022	34	0.021	51	0.015	252	0.036	152	0.008	55
CN		0.972	0.152	88	0.006	106	0.011	241	0.009	307	0.004	291	0.005	228	0.008	283	0.003	227	0.001	49
CM		-0.066	0.052	209	0.012	260	0.004	44	0.001	91	0.001	52	0.001	348	0.001	87	0.003	318	0.001	139
DCP 1	.010	3.147	0.595	179	0.220	340	0.134	352	0.057	339	0.036	252	0.041	179	0.054	261	0.018	280	0.034	101
DCP 2	.020	2.939	0.450	175	0.195	327	0.116	8	0.036	26	0.017	306	0.028	167	0.055	291	0.027	294	0.020	139
DCP 3	.030	2.794	0.821	169	0.186	325	0.034	350	0.047	21	0.014	303	0.035	350	0.011	259	0.027	320	0.018	167
DCP 4	.049	2.184	0.483	158	0.134	266	0.033	40	0.002	355	0.031	24	0.017	298	0.026	336	0.039	306	0.013	126
DCP 5	.074	1.998	0.448	153	0.104	248	0.001	203	0.009	309	0.026	6	0.021	269	0.019	283	0.021	315	0.009	49
DCP 6	.099	1.868	0.375	143	0.089	235	0.022	223	0.009	269	0.014	302	0.024	234	0.011	298	0.020	308	0.002	41
DCP 7	.149	1.626	0.272	126	0.056	220	0.016	195	0.010	197	0.010	243	0.001	170	0.018	281	0.023	297	0.005	305
DCP 8	.200	1.449	0.208	119	0.055	235	0.017	324	0.019	315	0.014	272	0.006	319	0.011	301	0.023	305	0.021	15
DCP 9	.250	1.355	0.231	112	0.041	209	0.024	210	0.015	324	0.013	105	0.014	209	0.009	241	0.007	158	0.004	243
DCP10	.300	1.223	0.211	97	0.028	171	0.022	211	0.022	297	0.013	19	0.010	169	0.003	163	0.009	135	0.010	195
DCP11	.399	1.070	0.217	79	0.031	130	0.024	220	0.019	292	0.002	109	0.010	248	0.004	223	0.012	210	0.004	93
DCP12	.501	0.871	0.213	58	0.036	98	0.020	249	0.020	321	0.007	332	0.010	265	0.009	330	0.011	188	0.002	353
DCP13	.600	0.719	0.227	44	0.045	91	0.015	236	0.010	295	0.008	291	0.004	249	0.011	317	0.009	127	0.003	225
DCP14	.701	0.603	0.216	34	0.047	71	0.013	231	0.004	272	0.004	222	0.006	175	0.007	269	0.009	105	0.002	24
DCP15	.800	0.451	0.195	30	0.045	66	0.015	225	0.001	70	0.012	235	0.004	176	0.011	248	0.006	169	0.002	347
DCP16	.900	0.176	0.138	34	0.040	55	0.006	234	0.008	183	0.009	226	0.004	106	0.003	240	0.008	103	0.003	314
DCP17	.969	0.024	0.055	46	0.013	51	0.009	240	0.003	39	0.002	251	0.004	97	0.001	315	0.011	156	0.003	357

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.80	0.070	0.499	4.99	0.0	19.80	12037.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
166.8 (547.1)	72917. (1522.9)	0.79E 07	-0.136	1.145	21.63	-0.00234	3.115	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.801	4.995	0	0.218	12	0.047	260	0.006	177	0.023	38	0.024	63	0.023	209	0.043	145	0.003	354
CN		0.989	0.149	79	0.001	92	0.008	153	0.002	356	0.008	276	0.003	335	0.004	204	0.008	268	0.002	31
CM		-0.084	0.042	223	0.009	222	0.002	281	0.002	218	0.002	56	0.002	163	0.001	26	0.002	110	0.000	245
DCP 1	.010	2.711	0.701	167	0.126	63	0.025	110	0.056	295	0.069	12	0.032	217	0.031	190	0.037	295	0.019	33
DCP 2	.020	2.509	0.586	168	0.107	75	0.038	195	0.009	323	0.052	37	0.035	206	0.014	227	0.052	279	0.021	58
DCP 3	.030	2.384	0.693	162	0.169	271	0.067	121	0.039	290	0.022	75	0.027	211	0.015	263	0.017	237	0.003	211
DCP 4	.049	2.129	0.174	125	0.098	233	0.025	211	0.015	7	0.025	144	0.023	138	0.024	160	0.017	276	0.009	51
DCP 5	.074	1.971	0.188	122	0.099	231	0.019	254	0.024	297	0.014	149	0.018	174	0.014	163	0.030	247	0.010	139
DCP 6	.099	1.874	0.165	104	0.091	224	0.021	194	0.025	265	0.011	258	0.010	231	0.014	65	0.008	261	0.010	261
DCP 7	.149	1.628	0.145	98	0.057	199	0.024	225	0.016	218	0.015	326	0.009	271	0.007	16	0.023	276	0.016	66
DCP 8	.200	1.427	0.166	91	0.038	208	0.023	258	0.006	8	0.021	316	0.004	127	0.012	334	0.007	21	0.011	81
DCP 9	.250	1.347	0.186	95	0.040	210	0.015	239	0.014	141	0.017	261	0.004	141	0.009	259	0.007	168	0.007	353
DCP10	.300	1.232	0.186	85	0.026	198	0.012	147	0.012	150	0.017	290	0.005	52	0.005	193	0.012	182	0.005	270
DCP11	.399	1.106	0.198	75	0.008	34	0.018	121	0.008	94	0.017	289	0.011	23	0.009	202	0.012	235	0.010	309
DCP12	.501	0.927	0.192	63	0.021	52	0.015	105	0.006	65	0.011	287	0.012	0	0.003	355	0.000	301	0.003	271
DCP13	.600	0.789	0.191	55	0.026	48	0.008	119	0.007	60	0.012	257	0.011	9	0.008	192	0.005	283	0.004	163
DCP14	.701	0.673	0.189	46	0.041	37	0.009	77	0.010	23	0.009	240	0.007	356	0.009	217	0.011	300	0.003	247
DCP15	.800	0.517	0.177	44	0.043	50	0.008	149	0.008	342	0.008	219	0.010	306	0.006	172	0.011	282	0.006	87
DCP16	.900	0.213	0.[illegible]	53	0.029	28	0.008	115	0.007	352	0.008	176	0.009	293	0.006	219	0.010	294	0.005	52
DCP17	.969	0.043	0.0[illegible]	67	0.010	2	0.002	121	0.002	338	0.004	224	0.002	335	0.001	82	0.011	284	0.002	66

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.069	0.512	5.03	0.0	10.45	12043.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
171.6 (562.9)	76326. (1594.1)	0.80E 07	-0.072	1.291	12.59	-0.00127	1.735	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.452	5.032	0	0.243	28	0.021	111	0.040	81	0.030	9	0.088	28	0.114	287	0.027	231	0.028	192
CN		0.872	0.155	49	0.118	53	0.047	88	0.036	24	0.020	7	0.024	315	0.016	239	0.006	249	0.007	221
CM		-0.012	0.032	217	0.023	102	0.002	142	0.011	97	0.003	68	0.007	61	0.004	7	0.002	351	0.002	317
DCP 1	.010	3.741	0.165	194	1.038	71	0.218	120	0.180	90	0.084	47	0.019	55	0.055	307	0.021	298	0.033	322
DCP 2	.020	3.339	0.098	247	1.095	80	0.170	124	0.301	86	0.121	87	0.033	76	0.063	17	0.033	240	0.048	318
DCP 3	.030	3.207	0.171	312	0.929	83	0.099	118	0.341	89	0.122	95	0.076	78	0.099	83	0.046	224	0.042	356
DCP 4	.049	2.743	0.232	174	0.786	82	0.214	142	0.355	84	0.049	139	0.189	68	0.062	176	0.061	64	0.049	142
DCP 5	.074	2.502	0.255	210	0.636	78	0.247	99	0.157	80	0.125	57	0.087	66	0.031	38	0.054	97	0.021	117
DCP 6	.099	2.6	0.207	93	0.340	67	0.163	95	0.126	47	0.092	22	0.077	6	0.048	338	0.026	5	0.030	346
DCP 7	.149	1.608	0.234	53	0.232	51	0.087	70	0.087	20	0.068	355	0.086	327	0.053	273	0.036	297	0.035	274
DCP 8	.200	1.354	0.265	48	0.194	51	0.096	66	0.086	20	0.067	9	0.088	338	0.053	288	0.031	300	0.033	282
DCP 9	.250	1.221	0.300	40	0.181	44	0.095	47	0.091	359	0.071	344	0.078	312	0.054	272	0.039	278	0.041	258
DCP10	.300	1.050	0.267	39	0.133	36	0.070	52	0.072	354	0.058	336	0.068	294	0.044	242	0.026	261	0.031	231
DCP11	.399	0.859	0.236	41	0.085	26	0.039	75	0.043	343	0.021	349	0.045	297	0.034	226	0.014	228	0.020	209
DCP12	.501	0.647	0.197	43	0.061	10	0.030	82	0.035	321	0.010	316	0.029	276	0.023	221	0.013	208	0.013	172
DCP13	.600	0.518	0.162	51	0.049	345	0.030	110	0.029	308	0.003	195	0.018	266	0.016	196	0.007	179	0.011	137
DCP14	.701	0.435	0.122	67	0.050	317	0.028	124	0.023	297	0.006	221	0.019	244	0.015	170	0.009	147	0.011	121
DCP15	.800	0.261	0.114	40	0.052	300	0.008	142	0.026	280	0.007	202	0.023	234	0.015	155	0.007	165	0.011	97
DCP16	.900	0.009	0.112	21	0.045	296	0.018	322	0.020	262	0.012	257	0.016	208	0.009	177	0.008	115	0.005	102
DCP17	.969	-0.037	0.056	12	0.021	302	0.014	333	0.010	265	0.008	286	0.005	228	0.003	195	0.002	166	0.002	231

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.069	0.508	4.97	0.0	12.31	12043.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
170.0 (557.7)	75368. (1574.1)	0.80E 07	-0.075	1.276	11.96	-0.00160	2.172	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.307	4.965	0	0.239	19	0.069	204	0.014	224	0.014	184	0.046	211	0.040	151	0.032	142	0.009	0
CN		0.948	0.165	94	0.046	92	0.046	115	0.033	141	0.018	96	0.012	136	0.006	102	0.007	140	0.004	100
CM		-0.018	0.052	203	0.009	107	0.014	182	0.004	244	0.006	193	0.005	239	0.002	236	0.002	225	0.001	214
DCP 1	.010	4.135	1.010	168	0.220	67	0.322	166	0.038	157	0.085	167	0.034	223	0.041	193	0.002	193	0.009	158
DCP 2	.020	3.746	1.124	174	0.255	85	0.403	174	0.052	162	0.100	181	0.054	262	0.063	213	0.028	279	0.029	199
DCP 3	.030	3.610	0.927	177	0.234	91	0.374	176	0.059	220	0.118	192	0.059	265	0.068	207	0.027	317	0.023	226
DCP 4	.049	2.950	1.192	171	0.112	87	0.398	169	0.204	244	0.023	177	0.107	249	0.045	346	0.041	256	0.094	5
DCP 5	.074	2.340	0.633	146	0.301	123	0.259	165	0.141	202	0.085	211	0.108	268	0.088	348	0.045	59	0.041	75
DCP 6	.099	2.107	0.472	138	0.183	108	0.156	130	0.113	151	0.085	157	0.070	205	0.038	217	0.056	246	0.028	311
DCP 7	.149	1.704	0.303	108	0.149	89	0.116	113	0.087	137	0.061	116	0.049	148	0.015	152	0.035	194	0.018	187
DCP 8	.200	1.446	0.259	95	0.143	92	0.091	114	0.090	139	0.060	121	0.047	142	0.022	166	0.022	165	0.013	246
DCP 9	.250	1.309	0.253	77	0.126	89	0.097	98	0.098	118	0.062	89	0.057	128	0.040	127	0.049	150	0.029	155
DCP10	.300	1.149	0.250	66	0.081	84	0.081	92	0.073	115	0.052	84	0.043	116	0.033	114	0.033	130	0.027	133
DCP11	.399	0.969	0.224	59	0.041	88	0.054	78	0.043	127	0.036	70	0.025	114	0.022	99	0.025	120	0.016	90
DCP12	.501	0.723	0.203	52	0.006	107	0.050	55	0.018	112	0.024	34	0.021	81	0.011	27	0.013	95	0.010	50
DCP13	.600	0.571	0.183	53	0.026	265	0.034	41	0.014	151	0.019	25	0.012	75	0.008	24	0.006	19	0.002	303
DCP14	.701	0.471	0.152	56	0.047	267	0.032	12	0.011	154	0.021	357	0.010	65	0.002	0	0.015	16	0.010	304
DCP15	.800	0.297	0.166	38	0.028	294	0.036	359	0.015	81	0.014	10	0.017	60	0.010	70	0.008	14	0.006	72
DCP16	.900	0.049	0.146	21	0.021	359	0.032	349	0.017	42	0.009	4	0.013	8	0.005	20	0.004	288	0.004	5
DCP17	.969	-0.025	0.071	19	0.013	33	0.015	2	0.010	51	0.005	58	0.006	38	0.001	18	0.002	243	0.001	247

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.069	0.506	4.91	0.0	14.97	12043.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
169.4 (555.7)	74990. (1566.2)	0.80E 07	-0.102	1.191	11.61	-0.00189	2.595	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.970	4.911	0	0.236	2	0.023	254	0.025	256	0.038	3	0.040	34	0.046	187	0.014	151	0.005	37
CN		0.979	0.173	102	0.050	214	0.031	267	0.007	194	0.010	224	0.001	294	0.003	178	0.001	71	0.001	77
CM		-0.036	0.065	200	0.012	254	0.005	54	0.005	282	0.004	339	0.001	11	0.001	325	0.001	251	0.000	219
DCP 1	.010	3.732	1.236	168	0.179	274	0.138	76	0.098	241	0.009	282	0.032	213	0.016	2	0.024	332	0.015	140
DCP 2	.020	3.432	1.316	173	0.345	270	0.091	68	0.145	264	0.029	355	0.027	171	0.023	263	0.008	0	0.025	207
DCP 3	.030	3.298	1.335	175	0.320	263	0.062	335	0.164	267	0.109	349	0.026	114	0.015	38	0.021	146	0.038	192
DCP 4	.049	2.794	1.112	169	0.603	263	0.198	356	0.025	200	0.060	522	0.056	97	0.059	191	0.038	249	0.012	13
DCP 5	.074	2.353	0.723	157	0.317	241	0.114	320	0.023	259	0.036	279	0.015	340	0.011	169	0.029	187	0.022	255
DCP 6	.099	2.080	0.511	146	0.201	221	0.062	280	0.025	224	0.026	259	0.015	333	0.010	23	0.018	120	0.017	191
DCP 7	.149	1.703	0.300	120	0.102	191	0.032	219	0.034	195	0.031	230	0.018	252	0.004	337	0.012	69	0.008	56
DCP 8	.200	1.482	0.307	126	0.124	214	0.081	271	0.082	352	0.011	46	0.006	73	0.012	265	0.002	287	0.006	145
DCP 9	.250	1.390	0.302	114	0.130	186	0.098	247	0.024	321	0.003	270	0.012	53	0.012	210	0.010	263	0.012	71
DCP10	.300	1.220	0.246	96	0.106	171	0.087	245	0.017	256	0.023	253	0.014	1	0.013	134	0.018	298	0.011	19
DCP11	.399	1.020	0.233	75	0.070	158	0.091	239	0.019	209	0.034	248	0.014	337	0.001	84	0.013	27	0.010	16
DCP12	.501	0.786	0.225	51	0.040	135	0.026	251	0.024	157	0.028	206	0.018	269	0.000	289	0.010	318	0.007	325
DCP13	.600	0.621	0.223	42	0.012	133	0.026	273	0.020	109	0.024	177	0.008	229	0.007	122	0.008	177	0.004	54
DCP14	.701	0.512	0.219	33	0.009	26	0.019	287	0.031	96	0.021	139	0.009	162	0.008	116	0.009	127	0.006	205
DCP15	.800	0.356	0.222	24	0.025	32	0.016	259	0.019	105	0.018	139	0.005	132	0.006	152	0.010	57	0.004	196
DCP16	.900	0.108	0.154	26	0.029	45	0.011	199	0.006	90	0.006	86	0.008	110	0.005	249	0.006	79	0.003	55
DCP17	.969	0.006	0.063	33	0.019	67	0.006	231	0.002	277	0.000	73	0.004	182	0.002	178	0.004	85	0.005	86

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.25	0.134	0.511	5.52	0.0	0.03	12039.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
171.5 (562.7)	76316. (1593.9)	0.80E 07	-0.046	0.007	5.41	-0.00073	1.018	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.028	5.518	0	0.267	3	0.082	292	0.049	328	0.010	65	0.011	51	0.037	177	0.015	179	0.001	156
CN		0.129	0.483	354	0.011	10	0.004	281	0.010	338	0.002	291	0.001	307	0.000	87	0.001	82	0.002	86
CM		-0.016	0.023	298	0.003	331	0.001	54	0.004	159	0.000	94	0.000	208	0.000	50	0.000	335	0.000	34
DCP 1	.010	-0.662	3.161	342	0.089	301	0.218	292	0.200	6	0.134	63	0.053	123	0.019	42	0.032	90	0.021	148
DCP 2	.020	-0.351	2.500	347	0.078	349	0.019	264	0.017	204	0.023	10	0.028	135	0.031	216	0.038	313	0.030	16
DCP 3	.030	-0.126	2.236	346	0.120	20	0.075	128	0.083	194	0.046	282	0.012	3	0.010	140	0.016	296	0.022	352
DCP 4	.049	0.175	1.831	347	0.082	0	0.063	117	0.074	178	0.045	258	0.030	321	0.020	45	0.011	91	0.003	317
DCP 5	.074	0.321	1.469	347	0.056	342	0.014	86	0.039	154	0.023	245	0.018	300	0.012	2	0.009	70	0.005	132
DCP 6	.099	0.391	1.223	348	0.041	329	0.013	327	0.026	147	0.004	208	0.007	279	0.003	344	0.008	60	0.002	106
DCP 7	.149	0.273	0.896	349	0.027	334	0.008	322	0.014	135	0.011	182	0.004	277	0.001	315	0.004	316	0.004	97
DCP 8	.200	0.214	0.731	355	0.019	353	0.011	315	0.015	146	0.003	321	0.002	278	0.002	279	0.006	54	0.003	130
DCP 9	.250	0.199	0.631	352	0.017	14	0.009	307	0.019	352	0.001	276	0.003	255	0.005	186	0.003	297	0.008	92
DCP10	.300	0.190	0.530	353	0.018	359	0.004	340	0.018	316	0.002	119	0.005	281	0.004	116	0.007	241	0.007	87
DCP11	.399	0.171	0.426	2	0.013	33	0.008	309	0.021	339	0.000	137	0.000	195	0.003	208	0.002	160	0.002	100
DCP12	.501	0.125	0.317	6	0.008	69	0.005	338	0.019	346	0.000	275	0.002	143	0.003	130	0.003	124	0.002	114
DCP13	.600	0.146	0.241	11	0.010	80	0.003	261	0.019	338	0.003	329	0.003	224	0.003	50	0.005	58	0.001	175
DCP14	.701	0.210	0.169	14	0.012	95	0.002	249	0.018	339	0.003	311	0.001	0	0.003	316	0.004	106	0.003	34
DCP15	.800	0.100	0.098	26	0.011	153	0.008	233	0.025	334	0.002	10	0.006	44	0.004	134	0.004	166	0.003	251
DCP16	.900	-0.091	0.034	75	0.016	185	0.009	227	0.017	329	0.007	277	0.003	303	0.001	326	0.004	298	0.002	41
DCP17	.969	-0.045	0.029	162	0.008	191	0.007	195	0.016	4	0.005	284	0.001	122	0.004	297	0.000	320	0.003	223

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.27	0.136	0.506	5.49	0.0	2.48	12039.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
169.4 (555.9)	74990. (1566.2)	0.80E 07	-0.034	0.871	7.95	-0.00072	0.987	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.480	5.494	0	0.269	6	0.088	294	0.052	140	0.017	48	0.025	58	0.012	240	0.026	143	0.003	290
CN		0.387	0.485	353	0.022	0	0.005	325	0.008	131	0.000	296	0.002	146	0.002	318	0.002	339	0.001	4
CM		-0.008	0.023	301	0.003	251	0.001	132	0.004	320	0.000	249	0.001	248	0.001	147	0.001	155	0.000	201
DCP 1	.010	1.118	3.370	341	0.136	291	0.106	115	0.021	358	0.010	237	0.015	337	0.020	250	0.012	150	0.015	17
DCP 2	.020	1.058	2.678	346	0.164	283	0.100	148	0.094	42	0.063	307	0.031	199	0.003	337	0.030	198	0.033	79
DCP 3	.030	1.085	2.212	346	0.093	301	0.026	158	0.068	40	0.082	304	0.088	202	0.075	103	0.055	358	0.043	265
DCP 4	.049	1.176	1.867	346	0.067	315	0.049	316	0.035	226	0.027	118	0.021	27	0.021	269	0.019	193	0.008	69
DCP 5	.074	1.120	1.498	347	0.058	326	0.022	306	0.009	255	0.007	116	0.005	145	0.006	233	0.005	185	0.001	273
DCP 6	.099	1.046	1.236	348	0.054	347	0.023	319	0.010	288	0.004	196	0.003	171	0.004	290	0.010	162	0.001	93
DCP 7	.149	0.755	0.898	349	0.044	357	0.017	323	0.004	291	0.004	123	0.002	142	0.001	279	0.006	139	0.003	153
DCP 8	.200	0.604	0.734	354	0.037	12	0.014	326	0.009	310	0.004	144	0.001	4	0.004	271	0.010	291	0.003	36
DCP 9	.250	0.514	0.625	352	0.034	16	0.011	326	0.013	134	0.002	19	0.003	107	0.001	244	0.002	86	0.003	358
DCP10	.300	0.464	0.520	353	0.033	14	0.009	310	0.009	126	0.002	138	0.001	238	0.001	11	0.005	70	0.003	217
DCP11	.399	0.368	0.416	3	0.026	28	0.006	354	0.017	139	0.002	131	0.002	76	0.002	322	0.005	12	0.002	346
DCP12	.501	0.288	0.313	5	0.025	31	0.003	355	0.012	134	0.002	228	0.001	14	0.004	315	0.005	11	0.003	1
DCP13	.600	0.267	0.241	10	0.021	39	0.001	294	0.010	138	0.003	132	0.001	278	0.002	348	0.006	345	0.001	337
DCP14	.701	0.292	0.161	15	0.015	40	0.004	344	0.013	139	0.001	288	0.004	116	0.005	314	0.003	308	0.001	256
DCP15	.800	0.140	0.092	26	0.010	45	0.001	281	0.016	137	0.001	294	0.004	115	0.004	321	0.006	310	0.004	34
DCP16	.900	-0.085	0.030	45	0.003	264	0.003	21	0.010	130	0.004	39	0.004	28	0.002	337	0.004	222	0.001	191
DCP17	.969	-0.058	0.025	176	0.002	196	0.009	235	0.015	137	0.005	302	0.001	135	0.003	346	0.006	53	0.006	32

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	49.34	0.136	0.506	5.50	0.0	4.89	12039.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
169.3 (555.6)	75009. (1566.6)	0.80E 07	-0.029	1.096	10.33	-0.00090	1.235	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.892	5.302	0	0.261	10	0.113	294	0.048	358	0.033	56	0.019	91	0.010	232	0.018	120	0.004	229
CN		0.620	0.459	359	0.047	344	0.007	281	0.011	11	0.005	194	0.004	84	0.003	333	0.002	272	0.001	127
CM		-0.000	0.031	308	0.004	219	0.003	288	0.005	183	0.002	26	0.001	277	0.001	159	0.001	124	0.000	327
DCP 1	.010	2.523	2.900	343	0.216	11	0.205	300	0.110	184	0.053	352	0.078	192	0.041	70	0.011	205	0.020	34
DCP 2	.020	2.372	2.741	349	0.174	382	0.084	316	0.125	226	0.056	107	0.043	227	0.046	115	0.021	358	0.021	103
DCP 3	.030	2.310	2.478	348	0.214	282	0.022	306	0.108	232	0.103	125	0.027	9	0.049	120	0.061	14	0.022	282
DCP 4	.049	2.097	1.895	352	0.262	341	0.197	274	0.160	192	0.137	102	0.095	4	0.046	238	0.038	66	0.055	288
DCP 5	.074	1.799	1.417	353	0.221	341	0.138	241	0.088	128	0.049	38	0.024	21	0.044	319	0.040	225	0.016	167
DCP 6	.099	1.599	1.148	353	0.140	347	0.067	225	0.067	99	0.043	0	0.040	275	0.025	226	0.028	166	0.021	91
DCP 7	.149	1.168	0.844	354	0.074	344	0.026	177	0.035	41	0.030	297	0.019	206	0.007	76	0.001	187	0.002	217
DCP 8	.200	0.968	0.732	358	0.048	305	0.053	126	0.052	14	0.041	272	0.024	165	0.010	64	0.003	330	0.006	316
DCP 9	.250	0.851	0.634	355	0.035	263	0.063	94	0.071	344	0.053	223	0.029	111	0.024	6	0.011	272	0.008	183
DCP10	.300	0.733	0.507	357	0.024	314	0.036	82	0.044	333	0.031	201	0.024	82	0.017	330	0.012	220	0.011	95
DCP11	.399	0.593	0.390	9	0.033	2	0.015	92	0.024	355	0.015	210	0.013	72	0.009	307	0.002	31	0.002	82
DCP12	.501	0.434	0.289	15	0.040	7	0.004	112	0.013	4	0.005	190	0.006	58	0.005	284	0.002	20	0.004	43
DCP13	.600	0.364	0.207	26	0.045	12	0.008	203	0.013	41	0.008	190	0.006	44	0.004	1	0.002	345	0.001	302
DCP14	.701	0.344	0.134	44	0.051	16	0.012	224	0.014	35	0.003	173	0.003	87	0.002	294	0.003	281	0.001	45
DCP15	.800	0.167	0.086	60	0.031	10	0.006	211	0.015	19	0.005	170	0.005	197	0.002	344	0.005	292	0.006	162
DCP16	.900	-0.073	0.140	62	0.008	301	0.005	100	0.010	344	0.003	155	0.003	260	0.003	119	0.004	281	0.002	172
DCP17	.969	-0.046	0.114	137	0.014	264	0.008	108	0.011	318	0.004	153	0.003	354	0.002	24	0.006	12	0.003	247

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.28	0.137	0.505	5.43	0.0	7.47	12039.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
168.7 (553.6)	74693. (1560.0)	0.80E 07	-0.057	1.257	12.47	-0.00070	0.962	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.470	5.434	0	0.294	26	0.183	314	0.122	119	0.015	43	0.015	85	0.011	240	0.009	194	0.011	274
CN		0.741	0.364	24	0.138	3	0.038	261	0.020	159	0.005	79	0.006	313	0.005	209	0.003	147	0.002	67
CM		-0.002	0.023	255	0.022	82	0.019	332	0.006	263	0.002	215	0.002	158	0.001	67	0.001	230	0.000	155
DCP 1	.010	3.247	1.614	352	0.874	57	0.946	336	0.119	240	0.027	1	0.029	280	0.026	210	0.033	77	0.050	336
DCP 2	.020	2.913	1.539	1	0.713	62	0.585	351	0.222	260	0.062	31	0.107	282	0.039	231	0.043	183	0.066	16
DCP 3	.030	2.728	1.340	1	0.619	59	0.539	354	0.276	273	0.018	297	0.159	261	0.086	178	0.035	257	0.021	174
DCP 4	.049	2.375	0.927	20	0.756	41	0.348	331	0.095	304	0.081	288	0.084	269	0.089	223	0.059	183	0.031	188
DCP 5	.074	2.105	0.795	22	0.607	33	0.289	316	0.067	252	0.053	279	0.077	235	0.057	188	0.050	178	0.043	149
DCP 6	.099	1.864	0.678	23	0.474	26	0.232	297	0.091	202	0.027	183	0.050	178	0.054	122	0.032	94	0.033	67
DCP 7	.149	1.426	0.653	23	0.355	1	0.194	260	0.105	161	0.027	110	0.032	129	0.041	69	0.024	24	0.021	344
DCP 8	.200	1.184	0.606	27	0.292	356	0.161	255	0.082	168	0.037	138	0.043	101	0.033	34	0.020	322	0.019	9
DCP 9	.250	0.995	0.549	16	0.183	337	0.085	220	0.046	137	0.025	136	0.036	60	0.028	339	0.021	277	0.016	220
DCP10	.300	0.868	0.477	17	0.153	329	0.073	203	0.036	117	0.018	133	0.026	45	0.016	309	0.008	249	0.005	179
DCP11	.399	0.710	0.402	28	0.136	332	0.070	204	0.048	129	0.016	111	0.026	31	0.023	289	0.011	185	0.005	131
DCP12	.501	0.525	0.313	33	0.106	327	0.060	185	0.037	106	0.016	48	0.020	336	0.015	230	0.011	131	0.004	47
DCP13	.600	0.429	0.261	42	0.080	324	0.053	167	0.021	95	0.010	40	0.017	331	0.012	228	0.007	106	0.006	103
DCP14	.701	0.382	0.173	58	0.063	324	0.051	153	0.019	60	0.010	350	0.012	297	0.007	184	0.004	88	0.004	68
DCP15	.800	0.206	0.123	53	0.050	294	0.044	146	0.013	72	0.007	25	0.013	289	0.003	181	0.004	74	0.003	350
DCP16	.900	-0.043	0.077	31	0.052	260	0.033	130	0.008	105	0.009	5	0.011	262	0.010	138	0.009	5	0.003	215
DCP17	.969	-0.058	0.018	28	0.030	257	0.016	133	0.009	156	0.008	1	0.006	235	0.001	68	0.002	33	0.005	308

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.35	0.138	0.501	5.33	0.0	9.94	12039.5	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
167.0 (549.0)	73142. (1527.6)	0.79E 07	-0.134	1.454	14.14	-0.00107	1.449	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.936	5.330	0	0.313	38	0.144	352	0.194	209	0.011	169	0.036	77	0.012	220	0.009	138	0.021	238
CN		0.876	0.354	53	0.149	15	0.040	341	0.036	249	0.015	174	0.010	109	0.007	73	0.006	12	0.003	258
CM		-0.015	0.049	223	0.038	101	0.012	53	0.017	16	0.009	305	0.004	274	0.002	234	0.002	168	0.001	86
DCP 1	.010	3.725	0.303	33	1.181	71	0.206	0	0.115	85	0.013	355	0.024	74	0.034	344	0.063	266	0.040	216
DCP 2	.020	3.298	0.473	41	1.076	81	0.307	14	0.214	97	0.093	352	0.092	109	0.024	30	0.024	318	0.034	238
DCP 3	.030	3.066	0.438	41	0.888	84	0.373	33	0.186	74	0.141	7	0.129	91	0.094	9	0.030	116	0.004	267
DCP 4	.049	2.734	0.602	76	0.714	63	0.185	57	0.120	64	0.105	57	0.084	47	0.076	44	0.050	42	0.044	38
DCP 5	.074	2.387	0.584	74	0.577	55	0.156	46	0.123	31	0.066	17	0.079	33	0.067	24	0.066	31	0.059	16
DCP 6	.099	2.081	0.519	71	0.449	45	0.112	19	0.119	344	0.079	296	0.036	317	0.040	299	0.034	330	0.054	293
DCP 7	.149	1.621	0.567	57	0.356	23	0.118	356	0.149	312	0.096	261	0.055	259	0.049	225	0.019	250	0.050	226
DCP 8	.200	1.338	0.545	57	0.294	22	0.108	359	0.141	309	0.078	262	0.046	260	0.042	231	0.033	223	0.031	195
DCP 9	.250	1.184	0.519	49	0.239	2	0.082	332	0.105	276	0.066	216	0.035	206	0.037	165	0.024	147	0.024	126
DCP10	.300	1.037	0.476	47	0.207	356	0.082	323	0.101	259	0.057	190	0.021	176	0.026	142	0.013	114	0.013	121
DCP11	.399	0.857	0.439	53	0.172	353	0.059	326	0.086	259	0.049	194	0.023	178	0.027	142	0.017	113	0.015	88
DCP12	.501	0.694	0.374	51	0.134	338	0.042	307	0.082	238	0.047	165	0.029	143	0.031	102	0.023	46	0.013	6
DCP13	.600	0.535	0.332	55	0.128	322	0.028	265	0.069	219	0.048	138	0.025	104	0.026	67	0.021	6	0.010	307
DCP14	.701	0.462	0.269	58	0.121	302	0.031	216	.062	193	0.038	104	0.023	92	0.024	33	0.015	329	0.010	285
DCP15	.800	0.278	0.224	44	0.119	287	0.036	226	0.070	176	0.035	87	0.023	69	0.018	350	0.012	338	0.008	255
DCP16	.900	0.012	0.160	24	0.084	281	0.043	235	0.057	156	0.024	87	0.023	44	0.013	316	0.011	286	0.007	187
DCP17	.969	-0.046	0.065	24	0.044	288	0.021	251	0.032	163	0.013	103	0.009	57	0.004	56	0.007	331	0.006	258

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.65	0.136	0.500	5.23	0.0	12.01	12041.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
170.4 (559.2)	75325. (1573.2)	0.80E 07	-0.153	1.492	13.97	-0.00138	1.985	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.014	5.227	0	0.170	32	0.188	91	0.123	224	0.045	324	0.006	216	0.008	77	0.017	190	0.016	33
CN		0.954	0.337	72	0.090	55	0.065	42	0.021	0	0.026	308	0.008	268	0.007	251	0.022	248	0.005	357
CM		-0.030	0.070	213	0.021	130	0.023	147	0.007	124	0.011	96	0.004	41	0.002	41	0.001	336	0.000	206
DCP 1	.010	3.937	0.477	161	0.607	81	0.191	138	0.076	87	0.048	162	0.012	72	0.036	158	0.034	187	0.028	144
DCP 2	.020	3.552	0.748	156	0.612	92	0.261	151	0.062	105	0.059	199	0.019	28	0.051	191	0.035	263	0.055	209
DCP 3	.030	3.204	0.628	156	0.752	99	0.323	148	0.104	206	0.022	358	0.047	48	0.049	159	0.050	211	0.036	247
DCP 4	.049	2.780	0.801	123	0.359	104	0.257	147	0.103	150	0.073	211	0.075	275	0.048	302	0.029	344	0.020	1
DCP 5	.074	2.446	0.710	116	0.324	88	0.245	125	0.069	145	0.061	177	0.058	258	0.049	264	0.065	312	0.042	345
DCP 6	.099	2.144	0.591	108	0.270	72	0.208	100	0.063	64	0.055	107	0.021	130	0.030	168	0.028	213	0.013	254
DCP 7	.149	1.692	0.546	84	0.216	65	0.214	76	0.070	34	0.069	65	0.027	64	0.028	77	0.007	223	0.007	177
DCP 8	.200	1.459	0.492	80	0.184	66	0.171	68	0.062	30	0.061	30	0.008	44	0.009	89	0.031	148	0.013	92
DCP 9	.250	1.288	0.486	70	0.142	58	0.172	49	0.073	16	0.068	6	0.034	16	0.035	3	0.028	21	0.020	15
DCP10	.300	1.127	0.459	64	0.112	50	0.144	38	0.055	358	0.047	346	0.021	358	0.017	330	0.016	39	0.024	13
DCP11	.399	0.949	0.430	63	0.090	47	0.122	25	0.035	14	0.069	343	0.025	309	0.022	298	0.011	29	0.013	0
DCP12	.501	0.744	0.391	58	0.059	17	0.098	10	0.042	335	0.066	311	0.026	268	0.016	259	0.011	296	0.005	343
DCP13	.600	0.622	0.343	56	0.058	347	0.090	352	0.025	324	0.064	295	0.022	244	0.021	250	0.013	252	0.003	219
DCP14	.701	0.527	0.305	53	0.063	314	0.077	331	0.028	282	0.056	262	0.014	198	0.015	240	0.010	179	0.004	337
DCP15	.800	0.349	0.288	40	0.080	317	0.078	312	0.027	275	0.045	252	0.022	205	0.012	157	0.010	192	0.003	191
DCP16	.900	0.065	0.207	26	0.064	333	0.054	303	0.020	300	0.034	229	0.015	195	0.013	156	0.007	122	0.001	62
DCP17	.969	-0.017	0.087	28	0.036	353	0.032	320	0.008	327	0.018	248	0.007	209	0.006	194	0.007	97	0.004	66

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.65	0.137	0.504	5.23	0.0	14.79	12041.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
169.1 (554.8)	74593. (1557.5)	0.80E 07	-0.154	1.490	14.93	-0.00171	2.350	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.790	5.226	0	0.164	2	0.081	176	0.069	124	0.048	42	0.028	87	0.011	239	0.029	106	0.003	266
CN		0.983	0.345	88	0.073	113	0.039	103	0.018	107	0.021	100	0.011	59	0.006	52	0.001	147	0.000	33
CN		-0.041	0.087	210	0.019	222	0.015	192	0.010	221	0.006	238	0.004	208	0.001	201	0.001	239	0.001	191
DCP 1	.010	3.832	1.403	168	0.083	128	0.213	174	0.084	199	0.021	358	0.017	311	0.032	287	0.019	236	0.027	80
DCP 2	.020	3.631	1.390	171	0.113	195	0.258	179	0.074	236	0.020	49	0.024	334	0.031	65	0.012	65	0.037	99
DCP 3	.030	3.301	1.448	173	0.088	171	0.182	195	0.121	262	0.020	358	0.020	312	0.059	66	0.015	144	0.026	87
DCP 4	.049	2.794	1.362	156	0.292	235	0.071	175	0.041	301	0.029	9	0.077	37	0.030	101	0.045	88	0.019	132
DCP 5	.074	2.307	0.984	139	0.270	184	0.193	199	0.100	294	0.051	72	0.040	112	0.018	175	0.023	298	0.028	25
DCP 6	.099	2.069	0.798	128	0.196	158	0.203	156	0.119	228	0.023	259	0.021	337	0.034	65	0.015	195	0.007	154
DCP 7	.149	1.686	0.632	105	0.177	135	0.160	127	0.110	166	0.040	280	0.012	231	0.025	315	0.019	344	0.014	47
DCP 8	.200	1.475	0.552	98	0.189	136	0.142	135	0.098	166	0.045	191	0.015	234	0.015	286	0.009	252	0.012	58
DCP 9	.250	1.324	0.532	84	0.180	119	0.122	107	0.087	128	0.074	155	0.037	164	0.010	174	0.016	273	0.011	30
DCP10	.300	1.175	0.476	76	0.159	110	0.085	92	0.064	121	0.060	130	0.035	146	0.010	96	0.012	167	0.014	318
DCP11	.399	0.994	0.429	70	0.121	111	0.064	74	0.050	98	0.055	122	0.026	103	0.013	88	0.003	31	0.017	16
DCP12	.501	0.797	0.390	60	0.090	97	0.043	41	0.042	78	0.035	97	0.024	63	0.006	62	0.004	100	0.010	351
DCP13	.600	0.663	0.384	55	0.066	77	0.043	25	0.039	46	0.034	79	0.023	45	0.010	97	0.005	147	0.009	64
DCP14	.701	0.562	0.349	50	0.053	42	0.047	359	0.039	31	0.024	53	0.023	15	0.009	35	0.005	75	0.009	32
DCP15	.800	0.392	0.326	39	0.066	28	0.052	8	0.036	17	0.023	23	0.016	9	0.009	34	0.003	298	0.009	73
DCP16	.900	0.110	0.218	33	0.075	27	0.044	19	0.030	16	0.024	12	0.019	14	0.012	329	0.003	118	0.006	320
DCP17	.969	0.002	0.096	39	0.044	35	0.023	28	0.018	29	0.015	45	0.013	343	0.004	332	0.009	6	0.004	351

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.64	0.138	0.503	5.27	0.0	17.27	12041.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
168.4. (552.5)	74095. (1547.5)	0.79E 07	-0.159	1.377	15.76	-0.00210	2.074	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.264	5.267	0	0.195	357	0.088	278	0.040	108	0.034	38	0.013	93	0.022	237	0.019	167	0.005	332
CN		0.994	0.325	87	0.048	165	0.026	154	0.010	154	0.003	267	0.002	116	0.000	332	0.001	145	0.003	310
CN		-0.061	0.083	220	0.023	241	0.009	295	0.004	318	0.001	22	0.001	348	0.003	133	0.001	285	0.001	103
DCP 1	.010	3.131	1.247	163	0.077	238	0.040	6	0.040	73	0.017	310	0.038	75	0.009	233	0.034	212	0.005	180
DCP 2	.020	3.045	1.183	166	0.206	237	0.102	18	0.046	99	0.022	69	0.012	109	0.014	261	0.018	288	0.007	28
DCP 3	.030	2.911	1.258	169	0.348	272	0.074	356	0.075	78	0.031	130	0.020	103	0.051	177	0.035	311	0.012	4
DCP 4	.049	2.470	0.845	151	0.363	251	0.094	356	0.057	94	0.029	107	0.022	190	0.020	309	0.003	133	0.015	58
DCP 5	.074	2.185	0.638	135	0.263	224	0.034	267	0.014	348	0.024	8	0.025	130	0.019	262	0.011	313	0.009	319
DCP 6	.099	1.998	0.553	120	0.207	209	0.026	243	0.024	287	0.031	6	0.025	92	0.017	136	0.008	350	0.009	23
DCP 7	.149	1.701	0.487	101	0.183	182	0.051	199	0.014	202	0.022	252	0.012	324	0.005	351	0.008	43	0.012	58
DCP 8	.200	1.470	0.432	107	0.141	178	0.062	239	0.035	313	0.026	358	0.022	22	0.010	171	0.013	295	0.012	266
DCP 9	.250	1.378	0.445	96	0.149	156	0.055	190	0.018	189	0.010	357	0.011	39	0.016	71	0.012	184	0.014	157
DCP10	.300	1.227	0.418	87	0.129	140	0.077	177	0.022	201	0.020	282	0.014	0	0.008	9	0.005	248	0.004	214
DCP11	.399	1.066	0.415	79	0.111	131	0.067	179	0.019	234	0.018	268	0.010	295	0.019	24	0.010	189	0.004	250
DCP12	.501	0.861	0.400	65	0.099	106	0.069	153	0.029	187	0.020	206	0.017	258	0.034	357	0.008	122	0.014	73
DCP13	.600	0.714	0.384	58	0.085	81	0.048	127	0.023	163	0.014	181	0.012	183	0.022	327	0.010	151	0.018	306
DCP14	.701	0.598	0.360	48	0.076	52	0.029	91	0.022	125	0.007	109	0.015	190	0.017	307	0.007	65	0.013	314
DCP15	.800	0.453	0.330	46	0.084	44	0.036	87	0.026	97	0.008	27	0.011	113	0.013	270	0.009	39	0.005	248
DCP16	.900	0.170	0.227	48	0.056	37	0.031	66	0.012	104	0.004	205	0.006	111	0.007	233	0.004	127	0.005	265
DCP17	.969	0.027	0.097	58	0.027	41	0.018	100	0.015	122	0.001	28	0.005	84	0.013	266	0.002	99	0.006	212

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.138	0.503	5.26	0.0	19.82	12041.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
168.2 (551.9)	74066. (1546.9)	0.79E 07	-0.168	1.299	20.38	-0.00224	3.064	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.823	5.264	0	0.227	3	0.031	260	0.023	274	0.032	32	0.008	67	0.024	221	0.008	140	0.009	326
CN		0.999	0.285	75	0.030	127	0.012	151	0.010	288	0.003	129	0.007	314	0.003	111	0.004	315	0.003	65
CM		-0.085	0.072	234	0.013	238	0.005	289	0.004	86	0.001	301	0.002	101	0.001	271	0.002	130	0.001	245
DCP 1	.010	2.344	0.584	155	0.019	186	0.051	55	0.040	82	0.042	38	0.025	28	0.022	337	0.013	339	0.020	287
DCP 2	.020	2.387	0.500	158	0.034	164	0.027	221	0.065	109	0.024	60	0.020	133	0.022	38	0.007	109	0.015	49
DCP 3	.030	2.349	0.720	160	0.217	267	0.050	109	0.019	354	0.058	102	0.038	168	0.015	194	0.014	214	0.011	255
DCP 4	.049	2.284	0.269	119	0.121	231	0.052	347	0.023	91	0.036	217	0.006	27	0.012	341	0.009	193	0.018	138
DCP 5	.074	2.061	0.280	107	0.114	216	0.048	317	0.007	29	0.016	220	0.027	339	0.012	88	0.016	187	0.004	333
DCP 6	.099	1.971	0.286	85	0.132	205	0.045	294	0.018	326	0.012	137	0.009	75	0.012	80	0.005	193	0.016	348
DCP 7	.149	1.675	0.278	87	0.119	165	0.055	245	0.026	359	0.030	345	0.026	338	0.010	129	0.007	344	0.022	118
DCP 8	.200	1.423	0.289	88	0.065	171	0.032	219	0.026	335	0.002	242	0.016	33	0.019	92	0.009	179	0.002	123
DCP 9	.250	1.361	0.325	84	0.060	147	0.039	191	0.015	260	0.008	278	0.011	344	0.013	120	0.013	214	0.011	9
DCP10	.300	1.240	0.328	77	0.062	136	0.035	181	0.009	276	0.011	231	0.013	317	0.017	211	0.005	344	0.004	244
DCP11	.399	1.118	0.381	74	0.059	121	0.037	157	0.022	262	0.006	139	0.010	288	0.008	330	0.012	53	0.005	51
DCP12	.501	0.936	0.380	66	0.063	103	0.034	130	0.017	265	0.007	104	0.006	168	0.013	268	0.021	356	0.006	34
DCP13	.600	0.795	0.364	62	0.054	86	0.023	112	0.012	290	0.007	103	0.013	306	0.006	148	0.012	325	0.004	85
DCP14	.701	0.682	0.329	56	0.059	50	0.023	97	0.009	264	0.002	81	0.008	299	0.006	143	0.013	293	0.004	178
DCP15	.800	0.524	0.298	54	0.046	46	0.018	81	0.007	293	0.005	118	0.011	261	0.007	98	0.007	271	0.004	105
DCP16	.900	0.219	0.217	56	0.041	29	0.012	84	0.013	270	0.010	95	0.008	298	0.010	51	0.008	208	0.006	44
DCP17	.969	0.047	0.104	68	0.012	61	0.009	109	0.015	262	0.003	169	0.005	304	0.008	70	0.001	108	0.008	19

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.71	0.200	0.524	5.96	0.0	0.77	12047.1	20

V	Q	RN	CM MIN	CM(MAX)	ALPHA.MAX	AERO DAMP	TOR	EXT DAMP
175.2 (574.7)	79505. (1660.5)	0.82E 07	-0.048	0.567	7.11	-0.00065	0.945	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.771	5.902	0	0.516	343	0.134	218	0.049	154	0.009	42	0.023	64	0.002	58	0.012	117	0.007	186
CN		0.127	0.441	359	0.028	15	0.005	256	0.005	185	0.003	258	0.001	148	0.001	276	0.001	251	0.001	99
CM		-0.011	0.031	291	0.006	281	0.001	133	0.001	60	0.000	206	0.001	6	0.000	105	0.001	41	0.000	17
DCP 1	.010	-0.068	2.852	339	0.169	281	0.221	266	0.181	334	0.103	21	0.046	50	0.024	6	0.040	37	0.028	84
DCP 2	.020	-0.140	2.250	346	0.127	324	0.047	232	0.022	266	0.028	336	0.041	90	0.036	188	0.030	268	0.020	343
DCP 3	.030	0.012	2.027	346	0.145	355	0.072	195	0.071	177	0.051	256	0.017	24	0.010	168	0.015	257	0.014	320
DCP 4	.049	0.271	1.733	347	0.126	356	0.069	113	0.083	158	0.058	232	0.017	318	0.005	327	0.003	351	0.007	287
DCP 5	.074	0.462	1.367	347	0.103	343	0.017	80	0.052	127	0.038	209	0.013	264	0.015	299	0.014	14	0.007	101
DCP 6	.099	0.413	1.136	348	0.058	340	0.009	314	0.024	141	0.022	195	0.006	324	0.011	324	0.008	2	0.014	125
DCP 7	.149	0.296	0.821	351	0.055	344	0.011	259	0.010	110	0.009	240	0.004	61	0.005	233	0.000	195	0.002	281
DCP 8	.200	0.235	0.671	354	0.039	6	0.015	284	0.002	214	0.012	321	0.007	112	0.007	156	0.003	116	0.004	68
DCP 9	.250	0.172	0.547	356	0.044	358	0.012	242	0.009	178	0.005	166	0.005	143	0.002	250	0.001	67	0.005	352
DCP10	.300	0.157	0.496	357	0.039	359	0.008	250	0.007	207	0.001	156	0.002	121	0.001	355	0.005	131	0.005	322
DCP11	.399	0.167	0.398	12	0.036	31	0.007	223	0.007	236	0.001	296	0.005	203	0.002	298	0.004	213	0.003	16
DCP12	.501	0.106	0.306	18	0.033	45	0.006	209	0.006	222	0.005	6	0.003	235	0.001	67	0.001	269	0.003	49
DCP13	.600	0.114	0.235	25	0.026	59	0.006	305	0.005	228	0.005	45	0.004	183	0.002	75	0.003	204	0.004	131
DCP14	.701	0.195	0.168	32	0.024	67	0.003	277	0.004	219	0.006	295	0.002	34	0.001	154	0.003	257	0.003	183
DCP15	.800	0.083	0.105	48	0.023	84	0.004	320	0.002	234	0.003	316	0.003	155	0.003	344	0.004	239	0.003	185
DCP16	.900	-0.084	0.049	79	0.018	120	0.003	230	0.003	242	0.006	207	0.006	195	0.004	229	0.003	232	0.002	284
DCP 7	.969	-0.045	0.030	171	0.012	162	0.001	107	0.003	242	0.002	116	0.002	143	0.002	269	0.001	37	0.001	227

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.58	0.202	0.518	5.99	0.0	2.50	12047.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	YDR	EXT DAMP
172.9 (567.4)	78141. (1632.8)	0.81E 07	-0.042	0.807	8.76	-0.00684	0.949	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.501	5.951	0	0.489	340	0.093	197	0.014	186	0.020	153	0.026	73	0.012	210	0.008	138	0.005	49
CN		0.360	0.444	356	0.013	359	0.004	281	0.001	58	0.004	240	0.001	185	0.002	210	0.001	3	0.000	160
CM		-0.009	0.032	294	0.006	291	0.001	114	0.000	206	0.001	132	0.000	86	0.000	55	0.000	246	0.000	272
DCP 1	.010	0.936	3.138	337	0.215	269	0.116	105	0.042	30	0.026	175	0.014	82	0.011	178	0.005	119	0.006	359
DCP 2	.020	0.913	2.476	345	0.204	290	0.090	149	0.079	52	0.052	292	0.034	193	0.016	112	0.006	334	0.008	94
DCP 3	.030	0.921	1.977	345	0.112	334	0.044	312	0.016	200	0.013	289	0.013	179	0.021	102	0.021	351	0.013	244
DCP 4	.049	1.101	1.755	346	0.121	300	0.015	261	0.013	173	0.017	168	0.013	46	0.004	241	0.002	183	0.004	84
DCP 5	.074	1.035	1.401	346	0.096	316	0.014	252	0.007	199	0.012	197	0.008	77	0.002	288	0.007	52	0.002	311
DCP 6	.099	0.970	1.159	348	0.082	329	0.013	263	0.006	203	0.010	160	0.005	46	0.003	166	0.001	243	0.001	288
DCP 7	.149	0.701	0.836	350	0.062	337	0.008	285	0.006	185	0.008	179	0.002	128	0.003	198	0.002	11	0.000	110
DCP 8	.200	0.558	0.681	358	0.051	0	0.009	312	0.002	308	0.007	222	0.003	144	0.002	132	0.003	271	0.002	130
DCP 9	.250	0.498	0.581	356	0.052	354	0.009	305	0.002	226	0.006	217	0.003	207	0.005	251	0.004	353	0.001	300
DCP10	.300	0.437	0.483	358	0.045	1	0.008	286	0.002	321	0.008	214	0.004	179	0.003	337	0.004	318	0.002	203
DCP11	.349	0.368	0.391	12	0.041	20	0.006	313	0.002	157	0.003	272	0.001	260	0.001	215	0.001	309	0.001	159
DCP12	.501	0.276	0.299	18	0.038	24	0.006	294	0.002	5	0.004	303	0.004	262	0.003	260	0.002	328	0.004	233
DCP 3	.600	0.245	0.231	25	0.029	46	0.006	307	0.004	358	0.005	294	0.004	280	0.004	295	0.002	181	0.001	71
DCP14	.701	0.280	0.169	33	0.026	43	0.000	284	0.003	80	0.007	309	0.001	289	0.001	220	0.002	100	0.002	81
DCP15	.800	0.125	0.100	47	0.020	53	0.005	224	0.002	9	0.005	310	0.001	75	0.003	176	0.003	68	0.001	276
DCP16	.930	-0.062	0.041	76	0.010	62	0.002	187	0.004	101	0.002	294	0.002	140	0.003	286	0.002	62	0.002	68
DCP17	.949	-0.057	0.026	172	0.004	178	0.004	2	0.005	2	0.004	317	0.002	299	0.001	199	0.003	335	0.002	88

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.86	0.201	0.522	5.91	0.0	5.01	12047.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	DR	EXT DAMP
174.6 (572.7)	79314. (1656.5)	0.82E 07	-0.016	1.050	11.21	-0.00879	1.131	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.014	.915	0	0.485	347	0.141	190	0.020	204	0.018	156	0.026	75	0.27	237	0.004	63	0.002	19
CN		0.541	0.425	3	0.050	345	0.012	2[illegible]	0.002	18	0.002	198	0.001	266	0.001	177	0.002	17	0.001	410
CM		0.000	0.040	300	0.007	219	0.001	236	0.002	150	0.000	21	0.001	120	0.000	59	0.000	324	0.000	287
DCP 1	.010	2.406	2.803	338	0.109	349	0.118	302	0.041	189	0.016	116	0.032	133	0.016	42	0.011	315	0.006	306
DCP 2	.020	2.281	2.598	346	0.179	276	0.039	330	0.095	225	0.061	128	0.603	227	0.032	115	0.021	1	0.009	133
DCP 3	.030	2.206	2.335	345	0.219	270	0.021	206	0.072	209	0.076	117	0.330	17	0.014	107	0.029	4	0.014	275
DCP 4	.049	2.054	1.847	349	0.236	3.6	0.138	245	0.096	170	0.062	94	0.004	1	0.020	242	0.016	10	0.018	331
DCP 5	.074	1.754	1.393	352	0.225	323	0.139	225	0.073	116	0.021	39	0.021	35	0.026	315	0.017	244	0.008	180
DCP 6	.099	1.565	1.118	357	0.130	325	0.069	191	0.068	65	0.061	319	0.045	225	0.022	116	0.009	352	0.008	172
DCP 7	.149	1.127	0.812	356	0.058	322	0.027	131	0.043	359	0.039	256	0.027	160	0.016	50	0.011	301	0.013	181
DCP 8	.200	0.891	0.638	2	0.061	6	0.000	171	0.010	337	0.011	254	0.003	229	0.006	203	0.009	104	0.007	27
DCP 9	.250	0.788	0.544	0	0.060	355	0.004	262	0.013	280	0.013	164	0.005	315	0.004	206	0.004	61	0.004	254
DCP10	.300	0.672	0.449	3	0.056	351	0.006	275	0.009	300	0.009	165	0.002	241	0.005	190	0.005	58	0.003	272
DCP11	.349	0.558	0.363	14	0.055	13	0.010	258	0.007	339	0.006	209	0.002	2	0.004	218	0.004	141	0.004	357
DCP12	.501	0.415	0.281	27	0.050	16	0.006	281	0.003	1	0.003	16	0.001	95	0.004	189	0.001	130	0.002	154
DCP13	.600	0.351	0.223	37	0.044	19	0.007	303	0.007	12	0.006	241	0.001	120	0.002	218	0.003	282	0.004	209
DCP14	.701	0.344	0.167	53	0.044	15	0.004	324	0.006	18	0.003	265	0.002	347	0.001	154	0.004	44	0.004	22
DCP15	.800	0.160	0.113	69	0.032	5	0.001	349	0.004	316	0.001	156	0.002	296	0.004	250	0.001	29	0.002	143
DCP16	.930	-0.069	0.059	79	0.009	304	0.004	16	0.006	281	0.007	137	0.007	310	0.002	336	0.001	339	0.003	13
DCP17	.949	-0.065	0.023	151	0.[illegible]	301	0.[illegible]	79	0.006	307	0.[illegible]	43	0.[illegible]	267	0.002	125	0.002	38	0.[illegible]	180

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.79	0.201	0.523	5.85	0.0	7.51	12091.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
174.2 (571.6)	79299. (1656.2)	9.82E 07	-0.073	1.283	13.66	-0.00049	0.710	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.505	5.852	0	0.725	358	0.212	140	0.046	156	0.007	238	0.006	78	0.020	200	0.012	191	0.010	49
CN		0.708	0.475	24	0.116	315	0.037	168	0.010	18	0.015	279	0.012	193	0.002	164	0.003	90	0.004	33
CM		-0.009	0.032	242	0.030	41	0.019	275	0.007	143	0.005	130	0.003	28	0.001	268	0.002	243	0.002	155
DCP 1	.010	2.719	1.661	354	0.833	34	0.437	298	0.139	189	0.073	307	0.107	174	0.078	48	0.069	284	0.036	196
DCP 2	.02	2.444	1.552	10	0.705	27	0.344	310	0.124	252	0.056	287	0.123	227	0.080	124	0.050	323	0.030	185
DCP 3	.030	2.328	1.387	10	0.615	22	0.293	305	0.141	269	0.110	238	0.108	203	0.084	157	0.031	114	0.019	130
DCP 4	.049	2.199	1.170	17	0.632	18	0.246	292	0.069	295	0.133	259	0.123	189	0.093	146	0.049	143	0.008	80
DCP 5	.074	1.967	1.064	20	0.530	6	0.200	276	0.065	287	0.132	238	0.112	164	0.041	126	0.046	129	0.063	74
DCP 6	.099	1.756	0.930	20	0.407	352	0.170	259	0.019	156	0.068	207	0.086	120	0.046	59	0.026	17	0.041	349
DCP 7	.149	1.368	0.769	17	0.323	323	0.173	205	0.038	122	0.052	156	0.064	68	0.042	345	0.029	323	0.038	280
DCP 8	.200	1.111	0.764	24	0.272	322	0.151	204	0.035	122	0.044	137	0.058	92	0.048	332	0.025	296	0.030	241
DCP 9	.250	1.004	0.709	17	0.236	293	0.148	166	0.047	70	0.060	54	0.051	329	0.040	268	0.022	210	0.028	177
DCP10	.300	0.867	0.618	17	0.199	283	0.114	152	0.026	51	0.033	63	0.040	320	0.036	245	0.019	188	0.025	121
DCP11	.349	0.707	0.520	30	0.164	285	0.107	153	0.045	54	0.031	16	0.043	292	0.028	224	0.015	135	0.012	97
DCP12	.501	0.525	0.416	33	0.118	269	0.088	124	0.044	17	0.031	328	0.036	234	0.023	161	0.019	79	0.015	2
DCP13	.600	0.428	0.342	39	0.101	260	0.080	108	0.040	12	0.035	302	0.032	205	0.011	122	0.011	107	0.017	10
DCP14	.701	0.380	0.254	51	0.070	244	0.059	77	0.019	320	0.027	300	0.027	185	0.013	74	0.009	23	0.011	288
DCP15	.800	0.203	0.161	46	0.078	221	0.057	73	0.021	336	0.028	287	0.021	193	0.009	48	0.009	34	0.008	333
DCP16	.900	-0.033	0.101	25	0.066	209	0.033	60	0.017	9	0.030	261	0.015	142	0.006	34	0.001	350	0.001	65
DCP17	.965	-0.056	0.031	11	0.039	217	0.022	74	0.013	12	0.018	267	0.011	128	0.005	51	0.008	20	0.005	303

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.80	0.203	0.517	5.73	0.0	10.01	12091.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
172.3 (565.5)	77939. (1627.8)	9.01E 07	-0.161	1.496	15.74	-0.00055	0.761	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.012	5.727	0	0.768	11	0.235	167	0.069	172	0.012	341	0.042	5	0.025	201	0.014	192	0.007	57
CN		0.833	0.489	41	0.136	337	0.034	292	0.032	149	0.023	30	0.014	324	0.002	337	0.004	270	0.001	200
CM		-0.020	0.001	213	0.045	69	0.017	2	0.017	306	0.009	210	0.004	152	0.002	109	0.003	36	0.002	282
DCP 1	.010	3.283	0.783	16	0.982	49	0.208	309	0.209	72	0.139	324	0.043	221	0.016	194	0.008	220	0.032	149
DCP 2	.020	2.992	0.963	32	0.867	54	0.273	340	0.140	102	0.115	6	0.052	67	0.042	340	0.029	218	0.019	184
DCP 3	.030	2.827	0.728	47	0.810	57	0.122	14	0.104	8	0.124	13	0.067	334	0.056	332	0.011	321	0.012	2
DCP 4	.049	2.474	0.762	56	0.647	46	0.169	31	0.179	32	0.108	337	0.051	350	0.062	338	0.037	300	0.005	297
DCP 5	.074	2.188	0.776	56	0.594	36	0.133	13	0.165	10	0.104	317	0.088	335	0.070	309	0.030	288	0.026	327
DCP 6	.099	1.953	0.736	52	0.441	20	0.074	325	0.100	335	0.073	263	0.034	288	0.057	292	0.038	183	0.006	189
DCP 7	.149	1.550	0.792	42	0.375	356	0.096	294	0.101	281	0.077	222	0.030	223	0.050	186	0.031	130	0.016	144
DCP 8	.200	1.262	0.757	44	0.320	355	0.117	295	0.098	258	0.067	208	0.035	241	0.042	174	0.017	137	0.020	182
DCP 9	.250	1.140	0.702	37	0.283	330	0.083	267	0.103	219	0.061	163	0.018	132	0.048	100	0.037	57	0.034	2
DCP10	.300	1.009	0.663	34	0.241	318	0.086	253	0.101	196	0.047	103	0.015	182	0.045	94	0.041	18	0.026	302
DCP11	.349	0.838	0.596	43	0.196	316	0.079	255	0.105	193	0.056	95	0.010	95	0.036	88	0.035	18	0.032	313
DCP12	.501	0.644	0.523	42	0.173	330	0.073	231	0.100	165	0.064	72	0.021	23	0.030	32	0.040	318	0.028	235
DCP13	.600	0.520	0.443	43	0.155	279	0.064	200	0.094	138	0.071	39	0.032	343	0.020	340	0.038	264	0.031	168
DCP14	.701	0.458	0.363	43	0.154	256	0.061	161	0.071	112	0.052	6	0.029	340	0.018	291	0.027	219	0.020	116
DCP15	.800	0.263	0.283	29	0.146	241	0.051	157	0.072	96	0.044	358	0.028	327	0.023	251	0.021	178	0.016	73
DCP16	.900	0.018	0.183	16	0.103	239	0.061	172	0.063	73	0.036	337	0.025	296	0.017	235	0.024	162	0.018	53
DCP17	.965	-0.044	0.071	19	0.047	260	0.026	197	0.038	87	0.017	355	0.006	280	0.015	273	0.023	180	0.014	86

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.76	0.207	0.588	5.67	0.0	12.53	12081.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
169.1 (554.8)	75545. (1577.8)	0.809 07	-0.229	1.709	17.45	-0.00091	1.267	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.530	5.666	0	0.592	19	0.208	219	0.071	220	0.024	126	0.008	43	0.014	252	0.006	286	0.010	180
CN		0.942	0.529	96	0.122	9	0.057	324	0.044	240	0.033	160	0.014	108	0.007	94	0.004	6	0.002	184
CM		-0.034	0.096	207	0.039	101	0.031	77	0.019	18	0.012	318	0.004	283	0.003	240	0.002	171	0.001	121
DCP 1	.010	3.562	0.711	127	0.973	61	0.174	121	0.118	34	0.007	288	0.002	99	0.006	8	0.006	5	0.003	311
DCP 2	.020	3.186	0.779	101	0.901	76	0.178	97	0.150	55	0.154	224	0.075	185	0.052	151	0.049	80	0.036	85
DCP 3	.030	2.806	0.699	107	0.746	82	0.299	92	0.212	99	0.094	193	0.113	138	0.068	142	0.011	294	0.018	194
DCP 4	.049	2.700	0.811	100	0.680	71	0.293	111	0.098	96	0.131	139	0.092	108	0.046	134	0.047	158	0.048	163
DCP 5	.074	2.383	0.816	89	0.612	62	0.270	91	0.088	57	0.114	113	0.070	87	0.055	124	0.091	133	0.066	137
DCP 6	.094	2.114	0.770	80	0.340	48	0.222	65	0.117	353	0.078	70	0.060	32	0.047	48	0.037	33	0.020	58
DCP 7	.149	1.713	0.801	61	0.296	32	0.231	25	0.121	311	0.043	357	0.031	348	0.060	2	0.040	334	0.037	323
DCP 8	.200	1.421	0.790	62	0.266	31	0.212	20	0.122	312	0.035	345	0.022	352	0.046	356	0.035	331	0.020	314
DCP 9	.250	1.268	0.735	51	0.211	13	0.197	349	0.111	274	0.043	280	0.020	280	0.046	264	0.037	247	0.038	219
DCP10	.300	1.126	0.711	47	0.191	1	0.174	334	0.110	262	0.044	234	0.021	282	0.080	229	0.023	204	0.028	182
DCP11	.349	0.966	0.680	51	0.169	359	0.160	327	0.112	267	0.088	293	0.048	221	0.043	219	0.028	197	0.027	154
DCP12	.501	0.760	0.626	46	0.144	348	0.141	304	0.106	243	0.070	200	0.039	187	0.047	155	0.026	127	0.022	88
DCP13	.600	0.623	0.552	44	0.127	306	0.120	277	0.094	213	0.074	169	0.031	140	0.043	115	0.034	56	0.015	14
DCP14	.701	0.543	0.481	40	0.140	281	0.116	253	0.092	187	0.072	135	0.037	107	0.042	69	0.026	26	0.022	345
DCP15	.800	0.353	0.403	31	0.145	280	0.129	236	0.077	167	0.069	119	0.037	75	0.038	30	0.023	328	0.009	246
DCP16	.900	0.066	0.261	18	0.103	265	0.100	219	0.058	142	0.084	95	0.030	57	0.028	346	0.022	295	0.010	225
DCP17	.969	-0.021	0.113	24	0.054	301	0.057	258	0.042	184	0.033	114	0.010	61	0.017	7	0.008	318	0.004	255

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.59	0.214	0.489	5.65	0.0	16.88	12093.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
163.5 (536.5)	71021. (1483.3)	0.786 07	-0.287	1.856	19.00	-0.00186	2.243	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		16.885	5.643	0	0.190	349	0.053	325	0.035	0	0.031	3	0.016	11	0.013	221	0.006	109	0.003	209
CN		1.084	0.536	62	0.115	52	0.055	70	0.041	13	0.027	356	0.009	322	0.006	0	0.004	272	0.006	164
CM		-0.069	0.133	211	0.050	140	0.023	191	0.019	164	0.008	143	0.004	122	0.004	142	0.004	94	0.002	359
DCP 1	.010	3.556	1.557	160	0.161	218	0.190	137	0.051	242	0.077	31	0.041	16	0.067	17	0.031	73	0.029	44
DCP 2	.020	3.296	1.349	157	0.263	222	0.117	152	0.084	211	0.082	55	0.071	98	0.048	113	0.039	104	0.048	140
DCP 3	.030	3.095	1.271	159	0.212	235	0.115	232	0.038	346	0.070	335	0.054	38	0.035	84	0.010	103	0.030	165
DCP 4	.049	2.779	1.031	126	0.363	208	0.095	274	0.142	328	0.140	44	0.056	96	0.014	181	0.024	280	0.005	178
DCP 5	.074	2.388	0.821	107	0.221	174	0.078	180	0.070	230	0.086	326	0.063	12	0.041	83	0.023	97	0.014	149
DCP 6	.099	2.206	0.741	96	0.217	156	0.072	165	0.085	180	0.066	292	0.039	310	0.034	23	0.033	74	0.020	87
DCP 7	.149	1.872	0.748	74	0.241	126	0.115	156	0.097	143	0.043	204	0.052	274	0.025	315	0.023	293	0.017	39
DCP 8	.200	1.587	0.698	73	0.242	118	0.127	150	0.072	136	0.032	182	0.041	265	0.057	293	0.024	338	0.021	349
DCP 9	.250	1.444	0.696	63	0.276	85	0.160	101	0.084	68	0.043	85	0.042	184	0.035	183	0.036	204	0.034	217
DCP10	.300	1.294	0.662	57	0.263	72	0.156	92	0.098	51	0.043	60	0.024	160	0.026	153	0.026	179	0.018	196
DCP11	.349	1.135	0.701	56	0.235	67	0.190	100	0.091	62	0.058	57	0.023	95	0.020	130	0.011	150	0.008	211
DCP12	.501	0.937	0.674	48	0.213	41	0.113	67	0.097	28	0.099	18	0.038	38	0.018	70	0.019	61	0.012	119
DCP13	.600	0.787	0.663	44	0.219	25	0.108	39	0.100	9	0.055	356	0.034	355	0.023	25	0.015	27	0.008	135
DCP14	.701	0.679	0.612	39	0.220	8	0.107	8	0.098	334	0.062	320	0.020	300	0.021	346	0.028	324	0.002	169
DCP15	.800	0.504	0.534	35	0.203	357	0.114	352	0.093	318	0.048	287	0.027	281	0.021	323	0.023	248	0.008	164
DCP16	.900	0.197	0.361	34	0.140	339	0.082	332	0.060	307	0.029	289	0.024	286	0.014	288	0.031	264	0.015	170
DCP17	.969	0.043	0.168	42	0.076	349	0.043	329	0.032	324	0.019	317	0.014	265	0.014	312	0.015	225	0.009	244

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.84	0.200	0.524	5.95	0.0	0.05	12049.1	20

V	U	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
175.2 (574.9)	79553. (1661.5)	0.82E 07	-0.052	0.554	6.38	-0.00066	0.950	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.048	5.946 0	0.517 345	0.111 204	0.057 152	0.008 108	0.022 68	0.007 177	0.001 104	0.009 133
CN		0.106	0.447 358	0.029 6	0.007 233	0.004 204	0.004 254	0.002 104	0.001 215	0.001 311	0.000 35
CM		-0.015	0.031 293	0.006 286	0.001 103	0.001 56	0.001 160	0.001 300	0.001 352	0.000 53	0.001 10
DCP 1	.010	-0.733	2.994 339	0.171 288	0.212 262	0.182 333	0.096 27	0.045 58	0.015 347	0.030 17	0.020 73
DCP 2	.020	-0.409	2.348 346	0.150 329	0.043 208	0.018 264	0.021 317	0.036 93	0.031 183	0.024 264	0.016 333
DCP 3	.030	-0.193	2.108 345	0.160 352	0.079 131	0.062 177	0.043 246	0.014 10	0.010 137	0.012 244	0.018 307
DCP 4	.049	0.126	1.753 346	0.144 345	0.074 119	0.067 163	0.053 223	0.024 297	0.014 2	0.004 34	0.006 323
DCP 5	.074	0.268	1.368 347	0.114 335	0.029 110	0.033 135	0.036 196	0.018 246	0.020 275	0.018 338	0.013 32
DCP 6	.099	0.337	1.156 349	0.086 334	0.005 198	0.017 147	0.023 193	0.008 264	0.009 318	0.012 45	0.009 132
DCP 7	.149	0.237	0.836 351	0.053 334	0.018 229	0.001 155	0.007 186	0.004 107	0.003 294	0.006 337	0.004 351
DCP 8	.200	0.183	0.686 359	0.046 351	0.016 262	0.005 296	0.003 3	0.005 69	0.002 175	0.002 307	0.004 332
DCP 9	.250	0.174	0.591 356	0.045 354	0.008 254	0.007 184	0.001 146	0.006 95	0.001 155	0.005 141	0.002 286
DCP10	.300	0.160	0.495 358	0.037 2	0.005 242	0.008 217	0.006 251	0.007 105	0.001 119	0.002 116	0.002 63
DCP11	.399	0.147	0.399 12	0.034 30	0.009 274	0.006 234	0.006 274	0.006 163	0.002 239	0.001 346	0.002 87
DCP12	.501	0.110	0.307 18	0.031 54	0.010 277	0.005 258	0.003 287	0.002 121	0.001 7	0.001 270	0.001 78
DCP13	.600	0.117	0.237 25	0.023 53	0.010 262	0.005 236	0.007 245	0.002 39	0.001 20	0.006 250	0.002 241
DCP14	.701	0.195	0.169 33	0.024 65	0.006 261	0.005 198	0.007 322	0.003 70	0.004 170	0.002 189	0.002 203
DCP15	.800	0.092	0.105 45	0.022 87	0.007 257	0.002 201	0.004 343	0.004 117	0.003 195	0.003 235	0.002 193
DCP16	.900	-0.088	0.049 86	0.018 134	0.005 178	0.005 258	0.007 0	0.004 133	0.004 148	0.004 300	0.004 173
DCP17	.969	-0.046	0.036 172	0.011 158	0.000 199	0.006 109	0.004 168	0.003 125	0.007 203	0.005 55	0.003 218

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.87	0.202	0.520	5.93	0.0	2.49	12049.2	20

V	U	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
173.4 (568.9)	78562. (1640.8)	0.82E 07	-0.042	0.606	8.73	-0.00065	0.935	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.486	5.925 0	0.502 341	0.106 197	0.016 190	0.026 153	0.019 99	0.013 204	0.008 164	0.005 91
CN		0.358	0.444 357	0.034 356	0.002 203	0.001 341	0.003 235	0.003 237	0.001 164	0.002 51	0.001 118
CM		-0.008	0.032 297	0.007 251	0.001 165	0.000 292	0.000 170	0.001 106	0.000 8	0.000 273	0.000 238
DCP 1	.010	0.952	3.174 337	0.216 265	0.133 111	0.033 12	0.024 194	0.008 38	0.016 229	0.013 91	0.012 11
DCP 2	.020	0.928	2.497 345	0.215 289	0.138 147	0.067 46	0.064 294	0.044 198	0.017 110	0.002 287	0.019 81
DCP 3	.030	0.936	2.014 344	0.116 321	0.020 302	0.009 334	0.029 264	0.041 183	0.045 91	0.048 350	0.037 244
DCP 4	.049	1.105	1.765 346	0.128 333	0.020 252	0.021 194	0.016 146	0.013 21	0.013 251	0.007 122	0.007 73
DCP 5	.074	1.036	1.411 346	0.103 316	0.013 241	0.007 219	0.008 171	0.005 104	0.002 251	0.004 57	0.008 131
DCP 6	.099	0.971	1.168 348	0.085 331	0.017 271	0.006 212	0.010 198	0.002 191	0.001 227	0.004 64	0.003 150
DCP 7	.149	0.703	0.846 351	0.061 337	0.013 279	0.010 209	0.007 208	0.001 184	0.002 278	0.005 50	0.002 152
DCP 8	.200	0.558	0.686 358	0.056 359	0.010 284	0.003 330	0.006 219	0.006 244	0.001 101	0.003 152	0.004 153
DCP 9	.250	0.493	0.580 356	0.058 356	0.013 273	0.004 330	0.006 197	0.005 180	0.006 260	0.001 158	0.003 286
DCP10	.300	0.429	0.482 357	0.050 0	0.006 262	0.002 296	0.004 196	0.005 166	0.002 168	0.001 353	0.001 1
DCP11	.399	0.362	0.385 12	0.045 23	0.002 220	0.005 291	0.003 227	0.004 268	0.002 150	0.002 26	0.003 124
DCP12	.501	0.274	0.276 17	0.034 47	0.003 338	0.004 317	0.006 264	0.005 272	0.003 169	0.003 23	0.003 89
DCP13	.600	0.243	0.224 25	0.034 41	0.004 23	0.001 24	0.004 269	0.003 308	0.001 213	0.000 250	0.001 11
DCP14	.701	0.275	0.154 33	0.030 50	0.002 2	0.003 12	0.003 260	0.004 260	0.004 29	0.002 89	0.003 164
DCP15	.800	0.133	0.099 47	0.022 57	0.003 14	0.001 69	0.000 164	0.003 243	0.001 114	0.005 92	0.004 41
DCP16	.900	-0.062	0.038 80	0.007 52	0.002 319	0.006 116	0.004 28	0.005 304	0.002 194	0.001 21	0.002 202
DCP17	.969	-0.044	0.026 175	0.004 131	0.003 240	0.003 26	0.002 17	0.002 133	0.001 246	0.001 83	0.005 14

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.059	0.604	5.19	0.0	0.31	12055.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
199.8 (655.4)	104077. (2173.7)	0.93E 07	-0.043	0.653	5.46	-0.00091	1.452	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.307	5.186	0	0.231	8	0.035	249	0.018	200	0.027	40	0.022	99	0.021	238	0.009	285	0.004	141
CN		0.132	0.524	353	0.010	308	0.010	272	0.006	257	0.002	43	0.002	56	0.001	351	0.001	35	0.001	238
CM		-0.019	0.017	316	0.003	14	0.004	117	0.000	88	0.001	130	0.000	71	0.000	264	0.000	211	0.001	60
DCP 1	.010	-0.737	2.818	347	0.200	264	0.307	306	0.165	5	0.057	73	0.043	7	0.035	60	0.011	298	0.028	28
DCP 2	.020	-0.523	2.388	349	0.075	298	0.150	306	0.123	9	0.086	98	0.001	107	0.053	74	0.043	170	0.010	308
DCP 3	.030	-0.282	2.198	348	0.103	34	0.018	231	0.036	336	0.067	97	0.044	175	0.004	265	0.022	165	0.028	228
DCP 4	.049	0.125	1.949	349	0.074	32	0.073	154	0.045	242	0.038	79	0.042	154	0.035	260	0.016	307	0.008	278
DCP 5	.074	0.353	1.737	349	0.046	336	0.099	147	0.052	217	0.019	305	0.014	66	0.022	248	0.013	309	0.011	39
DCP 6	.099	0.493	1.549	350	0.110	275	0.114	151	0.015	190	0.024	294	0.028	39	0.021	278	0.010	221	0.009	55
DCP 7	.149	0.244	0.915	350	0.062	36	0.011	10	0.045	206	0.010	263	0.017	347	0.008	46	0.006	13	0.004	195
DCP 8	.200	0.714	0.764	353	0.027	355	0.015	332	0.018	212	0.005	295	0.010	22	0.005	52	0.006	81	0.005	133
DCP 9	.250	0.209	0.725	353	0.014	345	0.018	296	0.010	219	0.001	306	0.003	14	0.003	346	0.003	69	0.000	44
DCP10	.300	0.199	0.603	353	0.009	337	0.018	297	0.004	236	0.003	73	0.001	110	0.004	0	0.003	59	0.001	194
DCP11	.399	0.184	0.477	357	0.008	299	0.016	292	0.002	283	0.001	95	0.002	238	0.004	16	0.002	49	0.004	152
DCP12	.501	0.138	0.356	359	0.008	263	0.016	291	0.003	315	0.002	64	0.001	193	0.001	10	0.002	40	0.002	220
DCP13	.600	0.153	0.260	1	0.008	248	0.016	294	0.004	298	0.003	14	0.001	116	0.001	52	0.001	96	0.005	249
DCP14	.701	0.230	0.172	3	0.002	184	0.015	288	0.004	278	0.002	7	0.002	108	0.001	70	0.002	21	0.003	258
DCP15	.800	0.101	0.083	13	0.010	205	0.015	295	0.003	298	0.002	14	0.002	165	0.002	122	0.001	315	0.003	247
DCP16	.900	-0.093	0.081	117	0.021	208	0.013	276	0.005	274	0.001	238	0.003	356	0.002	130	0.000	17	0.002	262
DCP17	.969	-0.050	0.043	172	0.009	221	0.004	255	0.002	240	0.005	355	0.001	69	0.002	331	0.001	235	0.001	191

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.059	0.601	5.20	0.0	2.38	12055.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
198.5 (651.2)	103397. (2159.5)	0.93E 07	-0.027	0.982	7.62	-0.00094	1.482	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.377	5.198	0	0.206	6	0.039	267	0.020	204	0.021	32	0.014	71	0.018	226	0.011	152	0.004	4
CN		0.398	0.568	353	0.036	357	0.011	256	0.006	120	0.003	351	0.001	320	0.003	270	0.002	113	0.001	339
CM		-0.006	0.024	329	0.006	247	0.002	126	0.000	316	0.001	191	0.001	89	0.001	325	0.000	234	0.000	13
DCP 1	.010	0.596	3.289	347	0.370	40	0.044	85	0.066	202	0.022	183	0.008	131	0.013	236	0.020	344	0.010	348
DCP 2	.020	0.724	2.627	349	0.144	12	0.009	311	0.016	127	0.026	243	0.048	18	0.027	28	0.033	153	0.033	230
DCP 3	.030	0.877	2.280	349	0.102	359	0.024	280	0.039	47	0.007	114	0.016	73	0.031	290	0.011	244	0.006	327
DCP 4	.049	1.128	2.026	349	0.095	17	0.052	312	0.016	64	0.032	309	0.012	180	0.026	287	0.015	201	0.008	103
DCP 5	.074	1.241	1.853	349	0.069	342	0.061	313	0.016	203	0.027	316	0.024	199	0.005	310	0.013	195	0.015	90
DCP 6	.099	1.319	1.800	350	0.100	287	0.073	321	0.063	226	0.010	329	0.044	209	0.018	113	0.013	203	0.025	95
DCP 7	.149	0.977	1.426	352	0.261	273	0.114	175	0.033	197	0.108	133	0.116	35	0.060	295	0.011	29	0.043	789
DCP 8	.200	0.617	0.875	355	0.084	331	0.060	196	0.056	82	0.029	340	0.003	287	0.011	317	0.006	256	0.008	185
DCP 9	.250	0.552	0.720	353	0.044	347	0.036	165	0.052	56	0.043	320	0.025	235	0.013	191	0.014	139	0.015	57
DCP10	.300	0.469	0.566	354	0.055	18	0.017	208	0.034	64	0.037	320	0.032	226	0.017	140	0.013	7	0.012	40
DCP11	.399	0.389	0.442	358	0.058	43	0.020	322	0.005	199	0.002	335	0.003	236	0.002	115	0.002	47	0.002	327
DCP12	.501	0.289	0.333	359	0.045	40	0.017	314	0.005	206	0.002	303	0.002	270	0.001	284	0.001	59	0.002	116
DCP13	.600	0.257	0.247	1	0.040	41	0.016	307	0.004	196	0.002	58	0.002	300	0.001	311	0.002	74	0.003	172
DCP14	.701	0.291	0.148	5	0.039	48	0.014	307	0.005	198	0.002	47	0.002	337	0.002	230	0.001	45	0.002	129
DCP15	.800	0.127	0.082	11	0.021	44	0.011	291	0.003	156	0.004	48	0.002	341	0.001	236	0.003	68	0.002	217
DCP16	.930	-0.102	0.019	31	0.002	334	0.007	270	0.003	124	0.003	53	0.002	313	0.002	151	0.001	94	0.000	278
DCP17	.969	-0.067	0.024	177	0.007	258	0.004	193	0.001	44	0.002	337	0.001	346	0.001	216	0.001	210	0.002	247

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.060	0.598	5.19	0.0	5.02	12059.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
197.3 (647.3)	102296. (2136.5)	0.93E 07	-0.019	1.154	9.48	-0.00116	1.821	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.021	5.188	0	0.224	13	0.030	268	0.015	324	0.030	338	0.028	234	0.043	86	0.005	198	0.007	266
CN		0.635	0.446	359	0.106	36	0.044	327	0.029	268	0.021	190	0.011	123	0.009	79	0.003	355	0.000	69
CM		0.004	0.026	323	0.005	180	0.005	24	0.002	304	0.002	288	0.002	227	0.002	117	0.000	63	0.001	58
DCP 1	.010	2.045	2.332	348	0.471	47	0.100	336	0.017	324	0.025	305	0.011	275	0.012	9	0.009	191	0.005	296
DCP 2	.020	1.905	2.126	352	0.324	41	0.085	338	0.046	261	0.009	157	0.025	239	0.023	104	0.018	212	0.017	121
DCP 3	.030	1.919	1.909	352	0.262	36	0.064	332	0.048	254	0.022	150	0.024	234	0.031	109	0.012	204	0.019	113
DCP 4	.049	2.011	1.624	351	0.305	50	0.083	354	0.065	304	0.061	183	0.027	128	0.055	86	0.021	351	0.007	105
DCP 5	.074	1.995	1.441	350	0.335	60	0.109	354	0.103	305	0.086	204	0.047	113	0.057	80	0.038	4	0.010	287
DCP 6	.099	1.956	1.335	350	0.416	69	0.282	345	0.095	304	0.070	226	0.040	83	0.030	98	0.050	25	0.015	358
DCP 7	.149	1.621	1.080	358	0.250	36	0.281	338	0.147	264	0.097	294	0.139	220	0.014	158	0.088	202	0.041	125
DCP 8	.200	1.056	0.819	3	0.162	358	0.058	317	0.104	265	0.080	185	0.024	155	0.038	125	0.014	84	0.012	122
DCP 9	.250	0.909	0.673	359	0.106	350	0.024	286	0.069	253	0.077	165	0.034	102	0.040	102	0.038	38	0.016	351
DCP10	.300	0.766	0.530	1	0.103	357	0.027	270	0.049	250	0.068	168	0.044	96	0.036	75	0.037	18	0.022	323
DCP11	.399	0.595	0.363	5	0.086	29	0.017	282	0.012	244	0.027	163	0.030	78	0.019	6	0.012	306	0.007	275
DCP12	.501	0.426	0.246	10	0.084	37	0.018	294	0.006	227	0.011	144	0.013	59	0.006	341	0.004	270	0.003	255
DCP13	.600	0.341	0.155	18	0.082	44	0.020	308	0.005	259	0.006	183	0.009	72	0.004	340	0.004	263	0.004	236
DCP14	.701	0.326	0.067	49	0.083	50	0.018	315	0.003	324	0.004	228	0.003	75	0.003	290	0.003	209	0.002	181
DCP15	.800	0.149	0.053	51	0.044	32	0.014	265	0.005	138	0.004	107	0.004	24	0.005	268	0.003	178	0.003	167
DCP16	.900	-0.087	0.037	35	0.021	327	0.015	225	0.006	143	0.003	132	0.004	50	0.004	290	0.002	195	0.002	132
DCP17	.969	-0.076	0.008	149	0.013	285	0.004	237	0.003	225	0.004	124	0.003	96	0.003	266	0.001	134	0.000	286

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.060	0.591	5.07	0.0	7.49	12055.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
194.6 (638.6)	98207. (2051.1)	0.90E 07	-0.035	1.237	9.97	-0.00129	2.301	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.489	5.065	0	0.254	27	0.031	275	0.029	86	0.053	39	0.003	4	0.110	212	0.025	171	0.008	55
CN		0.805	0.266	14	0.144	53	0.038	33	0.033	17	0.029	325	0.014	278	0.012	271	0.004	208	0.003	125
CM		-0.002	0.020	252	0.020	100	0.005	8	0.005	90	0.004	14	0.002	5	0.001	318	0.002	311	0.001	223
DCP 1	.010	2.930	1.327	350	0.596	62	0.121	44	0.072	10	0.017	302	0.031	235	0.045	158	0.019	72	0.026	67
DCP 2	.020	2.677	1.255	352	0.508	41	0.172	36	0.097	19	0.382	325	0.039	292	0.043	220	0.017	68	0.028	117
DCP 3	.030	2.592	1.123	351	0.444	75	0.193	35	0.095	9	0.086	325	0.049	317	0.059	250	0.008	134	0.026	124
DCP 4	.049	2.476	0.631	348	0.564	76	0.160	36	0.053	46	0.117	347	0.081	299	0.063	276	0.029	273	0.019	209
DCP 5	.074	2.348	0.420	344	0.661	73	0.119	35	0.092	67	0.132	354	0.094	273	0.058	301	0.045	266	0.025	222
DCP 6	.099	2.251	0.311	359	0.763	70	0.091	90	0.157	61	0.113	356	0.095	247	0.079	336	0.062	262	0.024	267
DCP 7	.149	1.868	0.445	20	0.585	63	0.126	25	0.264	51	0.062	5	0.112	27	0.060	4	0.054	21	0.063	84
DCP 8	.200	1.288	0.501	27	0.277	53	0.166	12	0.073	11	0.108	353	0.023	310	0.041	2	0.012	322	0.005	58
DCP 9	.250	1.161	0.472	11	0.178	46	0.129	357	0.050	326	0.096	313	0.059	265	0.068	256	0.031	225	0.022	271
DCP10	.300	0.967	0.408	14	0.126	52	0.086	3	0.151	311	0.064	312	0.056	260	0.045	247	0.029	227	0.027	262
DCP11	.399	0.788	0.314	16	0.077	16	0.070	50	0.043	320	0.022	287	0.027	255	0.024	238	0.02	186	0.009	170
DCP12	.501	0.577	0.234	24	0.062	8	0.012	101	0.021	318	0.010	266	0.018	246	0.012	194	0.00	172	0.012	146
DCP13	.600	0.450	0.156	36	0.050	4	0.022	135	0.015	347	0.007	251	0.009	236	0.007	202	0.010	135	0.006	66
DCP14	.701	0.389	0.098	70	0.044	357	0.031	159	0.010	19	0.008	204	0.008	193	0.006	78	0.007	92	0.006	51
DCP15	.800	0.199	0.087	49	0.039	318	0.018	156	0.012	315	0.013	192	0.005	124	0.004	102	0.00	97	0.005	30
DCP16	.900	-0.050	0.063	21	0.038	296	0.004	279	0.011	275	0.007	208	0.006	183	0.004	115	0.0	118	0.007	31
DCP17	.969	-0.072	0.026	23	0.022	287	0.003	316	0.008	298	0.004	232	0.004	192	0.001	77	0.000	148	0.003	90

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.060	0.591	4.96	0.0	10.00	12055.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
194.1 (636.7)	97393. (2034.1)	0.90E 07	-0.071	1.243	10.18	-0.00135	2.092	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.996	4.956	0	0.261	24	0.058	219	0.022	128	0.008	138	0.037	123	0.061	92	0.008	12	0.015	332
CN		0.930	0.148	48	0.095	70	0.053	125	0.021	101	0.025	109	0.009	48	0.011	111	0.002	68	0.005	96
CM		-0.013	0.045	204	0.022	90	0.007	188	0.003	106	0.002	182	0.002	163	0.002	178	0.001	124	0.002	173
DCP 1	.010	3.379	0.194	358	0.536	74	0.112	77	0.016	94	0.039	2	0.030	342	0.020	253	0.010	38	0.014	308
DCP 2	.020	3.075	0.288	355	0.596	81	0.107	92	0.045	121	0.047	86	0.006	57	0.023	302	0.020	34	0.017	7
DCP 3	.030	2.908	0.236	351	0.572	81	0.087	110	0.094	110	0.058	78	0.022	145	0.023	353	0.012	11	0.006	27
DCP 4	.049	2.746	0.118	217	0.461	89	0.108	156	0.155	111	0.086	100	0.035	115	0.030	112	0.024	96	0.008	132
DCP 5	.074	2.618	0.258	177	0.368	82	0.189	164	0.142	100	0.087	137	0.056	100	0.041	132	0.030	116	0.021	132
DC 6	.099	2.498	0.497	166	0.288	76	0.268	158	0.095	97	0.113	145	0.042	89	0.056	143	0.025	119	0.032	149
DCP 7	.149	1.951	0.391	133	0.348	79	0.366	147	0.139	213	0.015	288	0.007	222	0.027	236	0.016	21	0.035	182
DCP 8	.200	1.434	0.290	93	0.359	83	0.129	123	0.093	97	0.062	138	0.084	204	0.014	172	0.009	286	0.010	99
DCP 9	.250	1.286	0.242	41	0.282	67	0.069	106	0.096	53	0.100	123	0.009	105	0.055	125	0.028	181	0.018	180
DCP10	.300	1.110	0.254	36	0.175	66	0.049	88	0.081	61	0.079	114	0.032	64	0.064	115	0.028	131	0.019	101
DCP11	.349	0.910	0.261	34	0.057	34	0.029	66	0.022	61	0.029	72	0.024	29	0.026	78	0.014	24	0.016	78
DCP12	.501	0.693	0.247	33	0.031	336	0.027	64	0.001	293	0.016	72	0.011	22	0.013	68	0.008	14	0.013	47
DCP13	.600	0.562	0.205	38	0.049	279	0.031	83	0.010	265	0.011	48	0.008	352	0.011	12	0.009	292	0.008	47
DCP14	.701	0.461	0.154	43	0.073	265	0.020	86	0.019	235	0.006	43	0.007	311	0.005	326	0.009	302	0.008	305
DCP15	.800	0.268	0.159	28	0.060	269	0.016	60	0.012	252	0.004	349	0.007	323	0.007	282	0.002	290	0.008	336
DCP16	.900	0.010	0.148	9	0.032	271	0.013	6	0.006	100	0.008	337	0.006	15	0.006	313	0.003	329	0.006	315
DCP17	.969	-0.052	0.057	12	0.012	302	0.007	346	0.005	68	0.004	35	0.007	5	0.004	357	0.004	263	0.002	328

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.17	0.060	0.631	4.59	0.0	9.62	12057.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
198.0 (649.7)	102248. (2135.5)	0.92E 07	-0.062	1.175	10.34	-0.00132	2.077	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.617	4.596	0	0.267	16	0.064	177	0.016	5	0.017	65	0.019	103	0.036	3	0.040	261	0.002	299
CN		0.912	0.138	48	0.086	72	0.042	126	0.018	48	0.014	95	0.009	71	0.004	37	0.001	68	0.003	65
CM		-0.012	0.047	207	0.017	87	0.007	166	0.002	113	0.005	148	0.003	168	0.002	95	0.002	87	0.001	106
DCP 1	.010	3.219	0.244	359	0.473	75	0.098	105	0.029	135	0.012	350	0.024	55	0.017	1	0.014	30	0.011	16
DCP 2	.020	2.924	0.144	356	0.521	80	0.091	111	0.056	135	0.049	146	0.017	137	0.019	340	0.025	40	0.014	66
DCP 3	.030	2.771	0.045	1	0.499	75	0.071	82	0.065	101	0.047	76	0.016	227	0.017	356	0.019	340	0.005	82
DCP 4	.049	2.617	0.074	225	0.400	44	0.127	173	0.154	107	0.096	132	0.072	148	0.021	100	0.036	138	0.026	109
DCP 5	.074	2.496	0.252	176	0.346	76	0.156	174	0.157	99	0.104	155	0.077	105	0.041	145	0.032	116	0.012	110
DCP 6	.099	2.379	0.511	171	0.295	63	0.204	163	0.105	66	0.104	150	0.068	106	0.061	134	0.025	108	0.026	149
DCP 7	.149	1.894	0.367	233	0.256	81	0.169	144	0.140	209	0.014	169	0.034	160	0.025	232	0.032	67	0.018	178
DCP 8	.200	1.396	0.274	56	0.304	87	0.157	122	0.078	103	0.077	136	0.010	153	0.021	148	0.006	72	0.004	50
DCP 9	.250	1.271	0.255	36	0.190	61	0.070	57	0.069	13	0.082	71	0.008	15	0.043	49	0.014	147	0.010	60
DCP10	.300	1.112	0.272	35	0.125	62	0.063	41	0.069	26	0.054	55	0.028	39	0.044	44	0.008	39	0.026	94
DCP11	.349	0.907	0.268	32	0.044	45	0.049	25	0.017	26	0.026	17	0.013	17	0.021	16	0.015	297	0.008	23
DCP14	.501	0.688	0.224	33	0.028	339	0.023	16	0.002	18	0.011	348	0.009	36	0.013	343	0.013	273	0.007	18
DCP13	.600	0.550	0.178	39	0.034	287	0.010	32	0.011	172	0.006	317	0.009	56	0.015	287	0.005	249	0.010	304
DCP14	.701	0.446	0.122	50	0.047	259	0.009	110	0.014	148	0.008	352	0.009	358	0.015	249	0.010	236	0.006	242
DCP15	.800	0.250	0.124	31	0.040	263	0.005	54	0.006	153	0.004	236	0.008	12	0.013	238	0.003	210	0.005	214
DCP16	.900	0.000	0.120	13	0.020	273	0.009	333	0.002	336	0.005	262	0.007	330	0.010	216	0.002	344	0.006	265
DCP17	.969	-0.047	0.051	13	0.008	281	0.011	337	0.003	315	0.001	64	0.007	357	0.005	258	0.006	294	0.005	260

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.18	0.060	0.601	4.89	0.0	12.19	12057.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
197.6 (648.3)	102033. (2131.0)	0.92E 07	-0.083	1.164	10.00	-0.00122	1.922	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.191	4.890	0	0.242	10	0.040	240	0.018	279	0.026	36	0.016	342	0.022	296	0.030	283	0.004	189
CN		0.985	0.130	79	0.014	144	0.023	177	0.017	219	0.010	238	0.008	208	0.006	315	0.004	352	0.001	330
CM		-0.022	0.058	195	0.001	132	0.006	158	0.003	284	0.001	315	0.002	308	0.001	101	0.001	87	0.001	234
DCP 1	.010	3.196	0.353	148	0.259	68	0.143	152	0.045	34	0.058	162	0.022	25	0.016	138	0.018	93	0.015	71
DCP 2	.020	3.184	0.345	142	0.240	71	0.149	153	0.032	50	0.039	177	0.010	133	0.013	135	0.008	159	0.022	77
DCP 3	.030	3.114	0.206	170	0.257	92	0.111	167	0.034	104	0.035	206	0.011	176	0.016	189	0.004	21	0.005	219
DCP 4	.049	2.725	0.522	170	0.113	63	0.178	185	0.057	252	0.054	214	0.036	241	0.012	257	0.005	298	0.014	316
DCP 5	.074	2.574	0.591	168	0.027	4	0.153	176	0.115	258	0.029	250	0.056	243	0.016	19	0.011	315	0.014	18
DCP 6	.099	2.419	0.702	166	0.135	253	0.110	161	0.131	249	0.050	303	0.028	218	0.020	5	0.026	16	0.003	221
DCP 7	.149	1.997	0.554	165	0.224	232	0.055	292	0.048	311	0.003	34	0.009	222	0.030	72	0.017	119	0.017	231
DCP 8	.200	1.567	0.265	114	0.088	171	0.086	179	0.034	248	0.013	306	0.006	189	0.011	358	0.019	31	0.006	166
DCP 9	.250	1.468	0.201	108	0.048	167	0.076	162	0.064	220	0.025	255	0.016	271	0.020	321	0.006	11	0.014	350
DCP10	.300	1.243	0.189	64	0.068	98	0.074	152	0.064	212	0.032	254	0.019	262	0.029	296	0.013	330	0.010	309
DCP11	.399	1.009	0.251	43	0.075	63	0.036	136	0.036	172	0.021	228	0.015	236	0.023	264	0.010	312	0.006	220
DCP12	.501	0.762	0.246	34	0.026	78	0.008	347	0.024	146	0.007	241	0.016	174	0.009	247	0.005	341	0.006	240
DCP13	.600	0.591	0.230	28	0.007	353	0.025	317	0.008	109	0.005	181	0.007	135	0.004	329	0.004	284	0.006	104
DCP14	.701	0.475	0.189	26	0.037	249	0.030	320	0.008	68	0.007	205	0.014	127	0.004	37	0.003	146	0.004	115
DCP15	.800	0.298	0.196	19	0.021	249	0.019	329	0.009	78	0.005	121	0.006	110	0.004	61	0.002	217	0.007	69
DCP16	.900	0.037	0.150	12	0.015	19	0.009	287	0.010	85	0.002	85	0.003	154	0.002	342	0.002	317	0.006	8
DCP17	.969	-0.035	0.048	15	0.012	44	0.006	67	0.001	345	0.001	85	0.000	89	0.003	227	0.002	257	0.004	24

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.060	0.599	4.92	0.0	14.85	12057.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
196.6 (645.1)	100960. (2108.6)	0.92E 07	-0.100	1.167	17.48	-0.00145	2.269	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.849	4.922	0	0.208	9	0.025	279	0.023	209	0.033	10	0.023	29	0.011	74	0.028	130	0.010	305
CN		1.010	0.147	71	0.010	253	0.009	348	0.005	213	0.004	235	0.008	287	0.002	11	0.004	185	0.003	202
CM		-0.043	0.054	199	0.006	233	0.001	105	0.001	40	0.002	339	0.002	38	0.001	22	0.002	328	0.001	47
DCP 1	.010	3.230	0.392	144	0.052	55	0.021	109	0.019	293	0.002	156	0.026	290	0.012	332	0.035	276	0.006	120
DCP 2	.020	3.321	0.430	143	0.087	61	0.073	121	0.051	238	0.026	157	0.029	345	0.024	327	0.043	266	0.006	102
DCP 3	.030	3.001	0.624	164	0.353	35	0.150	176	0.019	259	0.018	262	0.032	260	0.039	286	0.036	198	0.007	240
DCP 4	.049	2.656	0.539	150	0.188	251	0.050	278	0.057	299	0.022	335	0.012	321	0.022	32	0.003	92	0.006	1
DCP 5	.074	2.456	0.526	140	0.219	251	0.088	345	0.032	353	0.040	356	0.030	77	0.015	85	0.005	198	0.006	232
DCP 6	.099	2.220	0.442	138	0.147	252	0.062	351	0.018	57	0.019	30	0.007	31	0.004	19	0.009	9	0.015	21
DCP 7	.149	1.800	0.228	100	0.015	338	0.250	23	0.015	137	0.016	270	0.017	9	0.027	72	0.017	258	0.007	286
DCP 8	.20	1.499	0.125	102	0.096	245	0.028	337	0.020	273	0.006	16	0.017	290	0.010	174	0.011	230	0.009	77
DCP 9	.25	1.452	0.148	101	0.033	227	0.015	343	0.012	200	0.032	279	0.028	308	0.001	84	0.004	232	0.002	129
DCP10	.3	1.292	0.150	85	0.036	191	0.007	63	0.011	155	0.021	249	0.017	327	0.004	42	0.005	170	0.010	179
DCP11	.399	1.085	0.196	60	0.031	158	0.012	102	0.018	173	0.013	230	0.023	296	0.012	322	0.006	51	0.014	169
DCP12	.501	0.858	0.222	45	0.025	98	0.007	28	0.013	142	0.017	173	0.019	267	0.009	337	0.004	143	0.001	200
DCP13	.600	0.665	0.233	32	0.033	48	0.009	0	0.005	151	0.008	133	0.006	236	0.004	20	0.014	144	0.005	187
DCP14	.701	0.550	0.221	27	0.020	31	0.018	307	0.008	273	0.009	166	0.010	177	0.007	161	0.007	149	0.005	304
DCP15	.800	0.372	0.216	20	0.017	9	0.011	295	0.010	274	0.006	126	0.006	160	0.007	193	0.010	166	0.005	246
DCP16	.900	0.105	0.149	27	0.021	17	0.010	238	0.003	303	0.004	0	0.011	217	0.010	197	0.004	231	0.004	229
DCP17	.969	-0.008	0.058	36	0.010	34	0.002	220	0.005	308	0.002	102	0.001	70	0.006	212	0.004	178	0.007	241

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.15	0.060	0.596	4.97	0.0	17.15	12057.4	20

V	U	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
195.4 (641.2)	99524. (2078.6)	0.91E 07	-0.119	1.197	16.95	-0.00199	3.094	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.150	0.906 0	0.193 7	0.043 273	0.016 195	0.027 37	0.010 29	0.010 218	0.034 124	0.009 309
CN		1.016	0.141 66	0.027 52	0.006 232	0.002 55	0.004 343	0.002 313	0.005 281	0.001 1	0.002 148
CM		-0.077	0.045 213	0.007 236	0.003 43	0.002 208	0.000 151	0.001 169	0.001 56	0.000 95	0.001 53
DCP 1	.010	1.161	0.519 156	0.030 114	0.025 136	0.050 223	0.034 352	0.021 174	0.009 230	0.015 145	0.015 356
DCP 2	.020	1.013	0.428 157	0.043 137	0.024 73	0.042 222	0.041 288	0.024 89	0.016 317	0.026 323	0.012 39
DCP 3	.050	2.633	0.919 165	0.005 6	0.033 229	0.012 142	0.016 313	0.017 147	0.023 313	0.018 4	0.037 261
DCP 4	.069	2.318	0.310 129	0.102 420	0.044 34	0.014 151	0.015 18	0.018 168	0.027 310	0.016 63	0.022 110
DCP 5	.174	2.126	0.296 137	0.059 14	0.017 59	0.016 207	0.015 4	0.001 231	0.015 306	0.002 22	0.006 70
DCP 6	.259	1.932	0.165 99	0.025 95	0.038 166	0.018 109	0.009 147	0.011 255	0.018 314	0.011 349	0.013 73
DCP 7	.144	1.696	0.116 76	0.029 88	0.035 327	0.012 199	0.006 269	0.007 280	0.007 289	0.014 358	0.010 258
DCP 8	.200	1.466	0.065 70	0.028 43	0.037 159	0.014 100	0.005 211	0.006 161	0.011 296	0.013 205	0.005 185
DCP 9	.253	1.405	0.138 91	0.010 110	0.026 177	0.017 262	0.014 51	0.003 57	0.012 133	0.008 269	0.008 52
DCP10	.300	1.274	0.156 80	0.014 102	0.026 165	0.007 311	0.002 351	0.007 315	0.011 125	0.012 211	0.002 175
DCP11	.349	1.165	0.131 87	0.028 73	0.011 178	0.008 28	0.006 327	0.009 305	0.005 290	0.009 125	0.006 224
DCP12	.551	0.936	0.188 93	0.038 80	0.001 181	0.010 33	0.007 0	0.005 7	0.013 275	0.009 58	0.010 174
DCP13	.600	0.778	0.210 96	0.045 92	0.010 242	0.006 20	0.011 336	0.004 324	0.007 280	0.004 39	0.005 261
DCP14	.751	0.653	0.204 98	0.037 57	0.018 218	0.004 11	0.004 263	0.004 262	0.008 265	0.003 357	0.002 255
DCP15	.800	0.483	0.195 81	0.032 44	0.017 234	0.005 38	0.002 211	0.007 26	0.005 260	0.006 296	0.002 237
DCP16	.900	0.172	0.140 38	0.021 39	0.010 203	0.007 66	0.003 17	0.004 353	0.002 116	0.005 238	0.004 284
DCP17	.949	0.015	0.052 24	0.015 359	0.005 246	0.005 28	0.005 150	0.001 168	0.003 144	0.001 354	0.003 166

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNNEL MZ	DRIVE MZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.20	0.059	0.600	5.19	0.0	0.35	12059.1	20

V	U	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
199.7 (655.2)	69465. (1450.8)	0.62E 07	-0.026	0.563	5.53	-0.00066	1.065	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.328	0.194 0	0.202 4	0.061 273	0.023 179	0.028	026 121	0.027 218	0.003 194	0.006 334
CN		0.140	0.420 355	0.012 231	0.006 291	0.001 29	0.002 ---	.001 146	0.000 201	0.005 219	0.002 131
CM		-0.017	0.009 265	0.001 338	0.001 106	0.001 39	0.001 187	0.000 169	0.000 111	0.001 358	0.000 110
DCP 1	.010	-0.696	1.944 347	0.175 275	0.195 126	0.042 8	0.036 56	0.009 97	0.013 205	0.014 232	0.014 103
DCP 2	.020	-0.472	1.695 349	0.113 266	0.045 131	0.024 337	0.038 66	0.011 127	0.005 188	0.007 258	0.015 155
DCP 3	.050	-0.184	1.522 351	0.070 250	0.013 130	0.017 5	0.007 256	0.009 198	0.009 82	0.012 265	0.017 124
DCP 4	.069	0.190	1.372 352	0.061 234	0.009 103	0.019 21	0.004 168	0.014 210	0.006 47	0.019 242	0.011 142
DCP 5	.174	0.425	1.193 351	0.044 220	0.007 96	0.020 43	0.006 217	0.011 178	0.005 18	0.016 227	0.008 130
DCP 6	.259	0.526	1.054 350	0.050 235	0.006 38	0.011 23	0.010 249	0.007 142	0.000 76	0.010 231	0.005 146
DCP 7	.144	0.287	0.848 349	0.049 162	0.013 342	0.020 139	0.009 276	0.004 37	0.007 165	0.013 259	0.014 137
DCP 8	.200	0.227	0.721 346	0.026 253	0.011 152	0.010 40	0.002 278	0.005 193	0.006 176	0.009 265	0.007 102
DCP 9	.250	0.205	0.701 353	0.009 331	0.022 298	0.008 231	0.004 315	0.002 171	0.002 37	0.007 155	0.001 114
DCP10	.300	0.147	0.587 353	0.010 343	0.018 301	0.003 233	0.002 290	0.001 341	0.002 330	0.001 203	0.005 102
DCP11	.349	0.181	0.461 358	0.006 307	0.013 299	0.003 259	0.005 356	0.001 202	0.002 225	0.005 212	0.000 36
DCP12	.551	0.136	0.344 0	0.004 257	0.317 293	0.002 321	0.003 349	0.001 24	0.001 268	0.005 172	0.001 160
DCP13	.600	0.149	0.252 2	0.003 225	0.013 290	0.001 285	0.003 348	0.002 61	0.001 244	0.004 179	0.001 43
DCP14	.751	0.226	0.163 4	0.003 139	0.012 288	0.001 96	0.003 49	0.001 321	0.000 330	0.003 157	0.001 246
DCP15	.801	0.130	0.074 16	0.007 120	0.011 269	0.002 272	0.002 357	0.001 328	0.001 337	0.003 217	0.002 199
DCP16	.900	-0.093	0.023 141	0.019 225	0.011 277	0.003 196	0.003 330	0.001 45	0.002 235	0.003 219	0.004 250
DCP17	.949	-0.051	0.060 170	0.008 202	0.005 217	0.001 156	0.002 49	0.002 233	0.001 36	0.004 236	0.002 26

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.33	0.060	0.605	5.20	0.0	2.41	12059.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
199.3 (653.9)	69292. (1447.2)	0.62E 07	-0.040	0.910	7.52	-0.00096	1.522	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.407	5.201	0	0.275	359	0.090	301	0.029	183	0.042	22	0.020	145	0.010	22	0.164	6	0.025	177
CN		0.345	0.548	354	0.031	340	0.010	314	0.010	174	0.008	45	0.003	202	0.012	14	0.040	15	0.007	179
CM		0.002	0.024	330	0.002	210	0.004	171	0.001	304	0.002	207	0.002	25	0.004	198	0.015	196	0.002	353
OCP 1	.010	0.306	3.149	347	0.300	47	0.033	357	0.063	224	0.012	145	0.027	131	0.011	181	0.010	303	0.006	259
OCP 2	.020	0.750	2.595	350	0.150	27	0.038	138	0.060	203	0.061	291	0.067	20	0.039	60	0.035	170	0.022	249
OCP 3	.030	0.929	2.200	350	0.084	348	0.035	303	0.033	59	0.005	3	0.014	90	0.021	304	0.012	232	0.002	337
OCP 4	.049	1.147	1.954	350	0.073	12	0.062	318	0.015	93	0.034	316	0.017	191	0.016	304	0.015	210	0.004	103
OCP 5	.074	1.253	1.799	350	0.055	333	0.071	323	0.023	206	0.026	323	0.027	195	0.005	101	0.011	210	0.010	88
OCP 6	.099	1.297	1.720	351	0.094	290	0.084	323	0.079	226	0.021	111	0.020	215	0.019	127	0.000	146	0.010	92
OCP 7	.149	0.952	1.342	353	0.225	280	0.087	197	0.065	194	0.103	126	0.078	38	0.023	307	0.017	17	0.026	286
OCP 8	.200	0.629	0.861	355	0.068	310	0.062	176	0.061	73	0.032	338	0.002	279	0.014	285	0.009	227	0.007	156
OCP 9	.250	0.361	0.675	354	0.048	11	0.026	302	0.013	127	0.024	347	0.013	265	0.012	10	0.043	14	0.017	138
OCP10	.300	0.324	0.558	353	0.043	25	0.031	350	0.006	102	0.005	2	0.013	227	0.014	47	0.040	359	0.003	154
OCP11	.399	0.279	0.450	357	0.032	26	0.035	329	0.009	191	0.007	9	0.010	229	0.017	35	0.056	13	0.012	171
OCP12	.501	0.210	0.338	359	0.031	28	0.028	315	0.008	241	0.007	51	0.007	251	0.012	9	0.052	25	0.014	191
OCP13	.600	0.199	0.234	2	0.021	7	0.023	336	0.010	189	0.009	41	0.002	166	0.015	4	0.056	20	0.007	202
OCP14	.701	0.252	0.152	6	0.018	27	0.019	331	0.011	138	0.013	37	0.008	197	0.020	24	0.055	17	0.005	227
OCP15	.800	0.109	0.068	19	0.019	348	0.014	350	0.003	100	0.008	10	0.014	192	0.016	18	0.062	17	0.006	151
OCP16	.900	-0.099	0.009	112	0.007	286	0.014	31	0.005	131	0.012	39	0.006	191	0.022	19	0.060	8	0.020	162
OCP17	.969	-0.061	0.040	170	0.018	272	0.016	338	0.006	173	0.009	27	0.012	197	0.013	2	0.048	24	0.005	185

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.25	0.060	0.601	5.20	0.0	4.89	12059.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
197.8 (649.1)	68526. (1431.2)	0.62E 07	-0.016	0.954	9.56	-0.00103	1.630	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.887	5.204	0	0.208	14	0.099	280	0.008	208	0.032	352	0.012	246	0.029	128	0.008	91	0.012	297
CN		0.603	0.363	0	0.068	45	0.013	9	0.004	351	0.004	101	0.007	50	0.006	11	0.005	348	0.004	302
CM		0.002	0.016	302	0.010	186	0.007	75	0.003	352	0.001	289	0.001	263	0.001	104	0.001	78	0.000	240
OCP 1	.010	1.773	1.824	349	0.218	80	0.068	41	0.010	44	0.016	51	0.012	10	0.004	73	0.007	19	0.005	140
OCP 2	.020	1.641	1.625	352	0.152	73	0.052	45	0.027	342	0.008	261	0.013	12	0.012	336	0.010	51	0.005	317
OCP 3	.030	1.860	1.445	352	0.131	66	0.038	46	0.034	353	0.021	279	0.009	15	0.013	305	0.004	82	0.005	341
OCP 4	.049	1.921	1.201	350	0.164	90	0.075	66	0.059	22	0.044	291	0.015	220	0.010	276	0.006	172	0.003	196
OCP 5	.074	1.868	1.015	349	0.198	102	0.136	66	0.071	28	0.040	328	0.016	242	0.009	324	0.008	247	0.005	229
OCP 6	.099	1.788	0.907	350	0.221	101	0.178	57	0.055	37	0.036	11	0.006	187	0.022	24	0.008	313	0.004	208
OCP 7	.149	1.334	0.778	358	0.108	74	0.158	50	0.080	351	0.043	39	0.054	358	0.026	41	0.039	19	0.007	253
OCP 8	.200	1.018	0.614	1	0.067	32	0.034	38	0.064	345	0.043	282	0.013	260	0.016	328	0.007	284	0.009	273
OCP 9	.250	0.859	0.643	1	0.127	353	0.047	264	0.055	235	0.068	163	0.044	93	0.026	71	0.028	26	0.021	325
OCP10	.300	0.723	0.491	1	0.099	4	0.040	250	0.030	200	0.041	138	0.033	67	0.019	25	0.019	346	0.018	306
OCP11	.399	0.571	0.349	7	0.093	27	0.027	273	0.017	185	0.014	123	0.012	67	0.007	23	0.007	352	0.009	306
OCP12	.501	0.417	0.248	11	0.083	31	0.027	277	0.010	168	0.007	94	0.006	69	0.005	9	0.004	302	0.003	266
OCP13	.600	0.333	0.160	20	0.080	40	0.024	289	0.010	171	0.008	73	0.007	17	0.003	280	0.004	244	0.001	338
OCP14	.701	0.323	0.072	45	0.072	46	0.017	302	0.004	157	0.002	312	0.001	222	0.003	291	0.002	210	0.002	60
OCP15	.800	0.144	0.050	48	0.037	32	0.010	267	0.004	121	0.003	72	0.001	201	0.003	283	0.004	240	0.004	115
OCP16	.900	-0.087	0.037	27	0.022	308	0.015	219	0.009	133	0.005	69	0.002	100	0.003	265	0.002	276	0.003	70
OCP17	.969	-0.075	0.010	170	0.009	295	0.006	255	0.004	154	0.004	46	0.001	77	0.003	327	0.003	304	0.000	96

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.26	0.060	0.600	5.06	0.0	6.60	12099.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
197.4 (647.6)	68397. (1428.5)	0.62E 07	-0.029	1.097	9.79	-0.00112	1.766	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		6.596	5.063	0	0.249	19	0.044	263	0.008	83	0.033	27	0.035	359	0.051	181	0.034	114	0.003	130
CN		0.709	0.294	9	0.133	49	0.030	357	0.017	6	0.014	323	0.008	287	0.006	220	0.010	129	0.000	99
CM		-0.003	0.016	263	0.015	102	0.005	7	0.002	100	0.001	26	0.001	69	0.002	354	0.003	286	0.000	137
DCP 1	.010	2.345	1.624	350	0.503	58	0.062	15	0.034	18	0.008	311	0.010	240	0.016	130	0.006	166	0.006	19
DCP 2	.020	2.393	1.567	353	0.387	58	0.091	8	0.034	18	0.031	311	0.008	276	0.006	210	0.006	170	0.006	84
DCP 3	.030	2.335	1.376	353	0.349	60	0.109	6	0.026	347	0.033	327	0.019	309	0.013	249	0.005	199	0.011	150
DCP 4	.049	2.186	0.814	349	0.543	74	0.172	14	0.029	314	0.036	352	0.022	320	0.021	301	0.016	271	0.013	234
DCP 5	.074	2.075	0.591	349	0.613	72	0.137	12	0.045	36	0.049	345	0.013	234	0.015	334	0.007	301	0.011	293
DCP 6	.099	1.948	0.468	354	0.672	70	0.099	10	0.099	49	0.033	357	0.008	24	0.021	305	0.014	162	0.020	331
DCP 7	.149	1.662	0.571	9	0.471	62	0.163	359	0.117	42	0.054	340	0.035	23	0.013	86	0.014	191	0.036	89
DCP 8	.200	1.156	0.547	12	0.227	46	0.128	348	0.031	303	0.041	326	0.016	290	0.009	257	0.008	44	0.005	331
DCP 9	.250	1.004	0.472	11	0.162	29	0.069	340	0.022	292	0.033	318	0.020	271	0.019	271	0.013	172	0.011	262
DCP10	.300	0.856	0.380	11	0.121	20	0.029	321	0.019	313	0.024	293	0.015	260	0.019	250	0.020	173	0.011	193
DCP11	.399	0.688	0.294	18	0.093	21	0.006	305	0.014	343	0.011	311	0.015	276	0.012	208	0.015	136	0.005	167
DCP12	.501	0.516	0.230	20	0.069	15	0.006	161	0.016	2	0.012	312	0.015	276	0.016	197	0.016	115	0.003	175
DCP13	.600	0.408	0.169	29	0.062	9	0.012	201	0.007	356	0.007	293	0.011	261	0.012	185	0.016	112	0.005	74
DCP14	.701	0.368	0.091	52	0.039	9	0.016	153	0.012	344	0.006	207	0.002	353	0.006	180	0.012	103	0.003	347
DCP15	.800	0.182	0.080	42	0.032	332	0.007	224	0.005	264	0.003	147	0.001	92	0.003	180	0.010	90	0.003	6
DCP16	.900	-0.053	0.080	14	0.029	282	0.001	146	0.008	285	0.003	289	0.005	216	0.005	99	0.011	99	0.005	273
DCP17	.969	-0.068	0.018	5	0.017	280	0.002	268	0.002	329	0.002	30	0.002	276	0.006	169	0.011	120	0.002	42

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.26	0.060	0.599	4.96	0.0	9.80	12059.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
196.8 (645.8)	68210. (1424.6)	0.62E 07	-0.093	1.125	9.40	-0.00102	1.508	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.803	4.964	0	0.247	11	0.097	308	0.057	162	0.043	74	0.118	138	0.163	235	0.159	222	0.035	45
CN		0.859	0.138	61	0.108	58	0.031	106	0.039	97	0.004	319	0.017	74	0.015	223	0.040	237	0.012	81
CM		-0.016	0.044	199	0.019	106	0.007	198	0.007	212	0.005	106	0.006	180	0.009	60	0.017	52	0.006	212
DCP 1	.010	3.190	0.285	358	0.466	78	0.083	108	0.039	118	0.024	30	0.006	323	0.015	7	0.026	342	0.015	340
DCP 2	.020	3.018	0.405	358	0.474	77	0.111	109	0.032	112	0.044	104	0.013	133	0.013	14	0.023	16	0.008	325
DCP 3	.030	2.829	0.279	357	0.517	78	0.080	93	0.050	97	0.038	89	0.014	197	0.003	82	0.016	14	0.007	225
DCP 4	.049	2.454	0.350	18.	0.519	85	0.092	154	0.131	109	0.067	99	0.026	133	0.043	84	0.021	345	0.018	158
DCP 5	.074	2.331	0.504	174	0.394	80	0.152	162	0.089	108	0.061	131	0.018	155	0.034	111	0.004	234	0.015	147
DCP 6	.099	2.235	0.636	165	0.263	73	0.214	156	0.041	136	0.060	151	0.009	148	0.024	119	0.008	241	0.005	180
DCP 7	.149	1.761	0.403	135	0.329	73	0.280	146	0.111	199	0.037	267	0.005	226	0.008	14	0.011	327	0.014	256
DCP 8	.200	1.327	0.262	72	0.324	72	0.115	131	0.071	87	0.070	133	0.022	177	0.016	129	0.001	65	0.005	204
DCP 9	.250	1.140	0.266	58	0.262	74	0.092	8	0.160	109	0.024	14	0.127	101	0.017	231	0.028	110	0.057	199
DCP10	.300	1.011	0.288	53	0.214	60	0.113	2	0.082	93	0.030	0	0.081	95	0.024	124	0.025	243	0.087	157
DCP11	.399	0.822	0.237	51	0.110	27	0.040	328	0.070	121	0.032	330	0.056	136	0.016	94	0.058	248	0.051	80
DCP12	.501	0.652	0.258	41	0.069	344	0.034	39	0.030	84	0.028	323	0.032	85	0.020	284	0.056	248	0.018	60
DCP13	.600	0.512	0.178	39	0.055	316	0.005	154	0.033	81	0.019	349	0.040	332	0.029	228	0.063	256	0.026	58
DCP14	.701	0.456	0.149	30	0.067	273	0.032	101	0.021	11	0.018	257	0.048	353	0.071	240	0.055	282	0.048	5
DCP15	.800	0.260	0.138	27	0.046	313	0.025	47	0.032	15	0.025	266	0.019	316	0.036	226	0.069	238	0.020	344
DCP16	.900	0.033	0.166	356	0.024	289	0.034	90	0.038	37	0.011	243	0.020	348	0.035	249	0.085	222	0.022	40
DCP17	.969	-0.037	0.052	333	0.018	342	0.010	20	0.029	9	0.017	193	0.033	16	0.005	226	0.067	241	0.014	62

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.21	0.060	0.599	4.94	0.0	12.31	12999.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.8 (645.6)	68201. (1424.4)	0.62E 07	-0.099	1.097	11.42	-0.00122	1.914	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.306	4.937	0	0.224	10	0.048	244	0.012	203	0.027	47	0.019	46	0.033	221	0.032	189	0.014	3
CN		0.926	0.156	91	0.022	21	0.024	157	0.006	289	0.007	248	0.002	149	0.004	164	0.002	210	0.003	64
CM		-0.030	0.067	193	0.003	152	0.007	158	0.002	236	0.001	21	0.001	284	0.002	296	0.002	53	0.001	198
DCP 1	.010	3.403	0.158	143	0.154	75	0.096	159	0.015	77	0.029	154	0.006	247	0.023	154	0.008	98	0.006	109
DCP 2	.020	3.307	0.129	159	0.211	97	0.102	155	0.038	127	0.004	7	0.020	222	0.015	195	0.011	199	0.002	193
DCP 3	.030	3.082	0.236	172	0.234	93	0.117	170	0.050	126	0.011	227	0.011	164	0.006	248	0.001	12	0.000	34
DCP 4	.049	2.419	0.902	169	0.164	53	0.247	183	0.029	285	0.083	228	0.007	212	0.037	249	0.008	63	0.015	300
DCP 5	.074	2.241	0.898	165	0.088	339	0.154	177	0.070	280	0.031	282	0.007	333	0.010	33	0.017	94	0.009	39
DCP 6	.099	2.087	0.870	160	0.166	283	0.054	165	0.056	288	0.034	356	0.015	87	0.015	120	0.016	105	0.024	146
DCP 7	.149	1.755	0.659	145	0.151	262	0.013	99	0.036	349	0.044	87	0.032	183	0.012	255	0.005	185	0.007	258
DCP 8	.200	1.485	0.396	126	0.013	102	0.095	158	0.037	266	0.006	314	0.007	301	0.005	29	0.002	70	0.005	114
DCP 9	.250	1.335	0.299	106	0.070	67	0.116	139	0.053	231	0.036	308	0.017	344	0.011	290	0.005	54	0.006	187
DCP10	.300	1.131	0.242	77	0.095	56	0.094	135	0.034	218	0.025	274	0.011	355	0.007	254	0.005	314	0.007	49
DCP11	.399	0.930	0.230	52	0.077	61	0.026	109	0.005	65	0.020	242	0.014	225	0.015	212	0.007	239	0.003	128
DCP12	.501	0.730	0.258	42	0.046	34	0.009	328	0.011	46	0.015	208	0.006	95	0.010	149	0.004	78	0.012	87
DCP13	.600	0.583	0.248	34	0.024	336	0.025	319	0.003	62	0.010	184	0.012	114	0.012	85	0.008	268	0.008	63
DCP14	.701	0.493	0.219	25	0.037	276	0.032	316	0.014	17	0.002	251	0.005	10	0.008	108	0.004	219	0.004	74
DCP15	.800	0.324	0.228	15	0.022	253	0.023	344	0.007	35	0.003	286	0.006	145	0.007	109	0.008	239	0.012	349
DCP16	.900	0.075	0.188	5	0.013	18	0.011	299	0.007	60	0.007	170	0.002	20	0.006	133	0.005	192	0.003	275
DCP17	.969	-0.019	0.081	3	0.010	16	0.003	256	0.006	47	0.004	115	0.002	25	0.001	259	0.010	210	0.006	333

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.28	0.061	0.597	4.97	0.0	14.84	12059.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
195.8 (642.3)	67832. (1416.7)	0.62E 07	-0.112	1.136	14.81	-0.00189	2.953	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.843	4.971	0	0.217	4	0.047	261	0.017	188	0.024	60	0.009	317	0.032	262	0.034	148	0.011	0
CN		0.960	0.164	82	0.017	302	0.020	98	0.003	244	0.013	60	0.007	145	0.002	205	0.010	178	0.000	333
CM		-0.056	0.060	202	0.015	245	0.004	282	0.003	266	0.003	249	0.002	270	0.002	344	0.002	339	0.002	194
DCP 1	.010	3.380	0.411	168	0.021	212	0.091	166	0.040	253	0.009	300	0.031	289	0.017	295	0.004	334	0.003	278
DCP 2	.020	3.253	0.383	171	0.021	236	0.101	174	0.025	300	0.015	351	0.034	344	0.014	22	0.007	12	0.004	224
DCP 3	.030	2.780	0.509	174	0.178	267	0.067	261	0.059	320	0.017	298	0.033	359	0.034	119	0.018	222	0.007	156
DCP 4	.049	2.282	0.768	163	0.240	279	0.006	134	0.071	317	0. 41	71	0.001	175	0.030	54	0.014	188	0.008	242
DCP 5	.074	2.053	0.583	154	0.194	281	0.034	52	0.015	309	0.029	79	0.007	199	0.014	39	0.016	156	0.008	289
DCP 6	.099	1.904	0.451	144	0.128	278	0.029	62	0.015	250	0.032	34	0.013	150	0.021	347	0.026	122	0.009	287
DCP 7	.149	1.680	0.339	122	0.095	257	0.021	33	0.020	259	0.026	15	0.006	158	0.017	323	0.023	109	0.004	322
DCP 8	.200	1.487	0.286	112	0.089	245	0.015	38	0.014	263	0.009	48	0.008	207	0.007	342	0.006	106	0.009	281
DCP 9	.250	1.317	0.251	104	0.104	246	0.049	87	0.025	228	0.006	350	0.027	222	0.014	338	0.017	191	0.008	271
DCP10	.300	1.171	0.229	94	0.052	244	0.041	95	0.023	221	0.025	64	0.024	156	0.010	201	0.024	219	0.025	308
DCP11	.399	1.011	0.203	73	0.015	281	0.035	94	0.027	235	0.002	220	0.018	199	0.023	267	0.021	260	0.017	13
DCP12	.501	0.824	0.231	53	0.026	56	0.033	112	0.016	215	0.011	88	0 024	166	0.009	211	0.027	232	0.024	305
DCP13	.600	0.682	0.246	40	0.069	55	0.022	117	0.019	114	0.021	107	0.021	128	0.009	186	0.008	162	0.014	359
DCP14	.701	0.590	0.253	30	0.071	64	0.019	88	0.030	61	0.023	91	0.010	49	0.015	146	0.018	127	0.005	44
DCP15	.800	0.417	0.240	21	0.050	67	0.011	123	0.021	91	0.016	26	0.013	34	0.008	97	0.017	131	0.004	3
DCP16	.900	0.157	0.163	22	0.040	42	0.006	113	0.013	27	0.017	43	0.013	65	0.010	156	0.012	100	0.000	95
DCP17	.969	0.010	0.061	27	0.017	28	0.012	78	0.007	350	0.007	334	0.008	43	0.009	129	0.014	188	0.008	38

REPRODUCIBILITY OF THE ORIGINAL PAGE

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.23	0.060	0.597	5.02	0.0	17.35	12059.8	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
195.5 (641.5)	67861. (1417.3)	0.62E 07	-0.130	1.095	21.37	-0.00229	3.579	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.349	5.018	0	0.210	6	0.042	278	0.014	188	0.034	31	0.022	57	0.019	226	0.029	223	0.012	317
CN		0.947	0.155	62	0.013	216	0.009	283	0.003	118	0.006	254	0.001	70	0.001	352	0.003	46	0.002	306
CM		-0.083	0.046	218	0.008	254	0.003	32	0.001	287	0.002	31	0.001	152	0.001	196	0.001	82	0.001	103
DCP 1	.010	3.259	0.150	172	0.035	337	0.045	3	0.004	237	0.020	25	0.035	204	0.004	346	0.021	75	0.004	8
DCP 2	.020	3.123	0.209	166	0.066	11	0.041	347	0.006	21	0.010	330	0.030	221	0.014	275	0.030	88	0.004	187
DCP 3	.030	2.907	0.335	160	0.031	268	0.037	328	0.009	88	0.024	307	0.010	239	0.001	14	0.018	150	0.004	303
DCP 4	.049	1.867	0.290	139	0.143	257	0.041	347	0.003	342	0.009	352	0.018	65	0.009	98	0.031	73	0.013	96
DCP 5	.074	1.709	0.208	123	0.100	294	0.024	339	0.012	315	0.008	348	0.015	67	0.011	217	0.023	62	0.004	128
DCP 6	.099	1.606	0.166	105	0.073	257	0.010	342	0.005	271	0.009	308	0.010	126	0.007	202	0.031	68	0.006	182
DCP 7	.149	1.439	0.153	77	0.040	247	0.010	352	0.010	110	0.007	245	0.006	81	0.005	165	0.021	60	0.002	219
DCP 8	.200	1.328	0.147	71	0.042	228	0.011	291	0.007	183	0.010	283	0.006	86	0.004	169	0.019	83	0.013	268
DCP 9	.250	1.229	0.176	72	0.086	231	0.032	307	0.004	49	0.005	243	0.005	143	0.007	267	0.008	289	0.007	48
DCP10	.300	1.127	0.175	67	0.069	219	0.019	290	0.002	55	0.005	287	0.002	177	0.004	259	0.013	299	0.011	20
DCP11	.399	1.028	0.191	62	0.050	207	0.018	260	0.010	208	0.008	233	0.012	169	0.004	249	0.010	236	0.011	303
DCP12	.501	0.879	0.200	52	0.019	197	0.008	273	0.007	180	0.016	294	0.010	13	0.001	25	0.011	296	0.007	329
DCP13	.600	0.764	0.217	50	0.025	112	0.010	210	0.010	180	0.015	285	0.013	28	0.011	46	0.003	290	0.006	231
DCP14	.701	0.685	0.212	43	0.043	75	0.008	162	0.014	106	0.010	199	0.003	309	0.007	28	0.005	4	0.004	178
DCP15	.800	0.520	0.193	31	0.049	53	0.014	228	0.012	36	0.009	172	0.003	261	0.004	36	0.005	114	0.004	336
DCP16	.900	0.241	0.147	44	0.035	57	0.009	237	0.007	44	0.011	179	0.004	282	0.005	336	0.002	95	0.003	242
DCP17	.969	0.055	0.072	57	0.018	42	0.005	197	0.006	57	0.009	213	0.000	73	0.002	214	0.005	282	0.000	108

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.060	0.597	5.19	0.0	2.52	12061.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
197.3 (647.2)	36316. (716.7)	0.31E 07	-0.031	0.932	7.72	-0.00100	1.566	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.517	5.194	0	0.202	11	0.063	288	0.023	167	0.038	353	0.014	46	0.019	189	0.012	293	0.000	6
CN		0.394	0.541	354	0.034	4	0.014	282	0.008	167	0.004	59	0.001	170	0.002	290	0.010	318	0.003	40
CM		-0.004	0.025	329	0.004	254	0.001	114	0.000	319	0.001	200	0.001	39	0.001	135	0.003	131	0.001	268
DCP 1	.010	0.760	3.124	347	0.250	41	0.037	319	0.038	191	0.030	147	0.022	139	0.008	148	0.006	89	0.018	312
DCP 2	.020	0.689	2.671	350	0.221	41	0.066	149	0.042	197	0.042	288	0.018	51	0.024	291	0.008	290	0.015	22
DCP 3	.030	0.940	2.184	350	0.082	347	0.060	295	0.054	63	0.014	320	0.017	73	0.013	329	0.024	182	0.015	255
DCP 4	.049	1.151	1.965	350	0.079	10	0.074	312	0.029	94	0.032	314	0.023	187	0.008	279	0.014	196	0.005	56
DCP 5	.074	1.231	1.773	350	0.064	1	0.108	321	0.043	216	0.007	332	0.020	213	0.007	175	0.016	199	0.014	90
DCP 6	.099	1.217	1.610	351	0.074	324	0.094	316	0.066	225	0.015	176	0.023	202	0.020	132	0.003	217	0.007	93
DCP 7	.149	0.928	1.276	354	0.151	297	0.049	260	0.106	229	0.139	136	0.005	41	0.028	100	0.007	20	0.035	297
DCP 8	.200	0.658	0.916	355	0.100	293	0.073	181	0.051	84	0.012	358	0.016	56	0.023	291	0.019	288	0.003	227
DCP 9	.250	0.543	0.722	354	0.047	332	0.047	169	0.052	68	0.040	321	0.019	233	0.006	210	0.013	282	0.009	62
DCP10	.300	0.465	0.570	354	0.045	14	0.011	181	0.024	71	0.024	322	0.017	231	0.007	224	0.004	284	0.010	79
DCP11	.399	0.403	0.436	359	0.055	42	0.013	328	0.005	89	0.011	336	0.007	242	0.000	318	0.016	318	0.009	32
DCP12	.501	0.292	0.323	1	0.041	43	0.014	319	0.003	131	0.008	353	0.003	259	0.004	321	0.017	310	0.003	30
DCP13	.600	0.261	0.219	6	0.042	53	0.020	311	0.008	180	0.012	28	0.003	197	0.004	293	0.009	313	0.005	70
DCP14	.701	0.265	0.131	9	0.036	55	0.013	306	0.006	242	0.004	58	0.005	156	0.007	351	0.011	325	0.004	132
DCP15	.800	0.120	0.058	26	0.020	45	0.010	297	0.007	201	0.009	84	0.001	156	0.005	245	0.010	316	0.003	134
DCP16	.900	-0.099	0.018	45	0.012	250	0.010	211	0.006	171	0.002	327	0.001	216	0.003	343	0.019	300	0.005	94
DCP17	.969	-0.075	0.029	171	0.012	236	0.003	30	0.003	165	0.006	105	0.001	69	0.005	328	0.009	330	0.002	116

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.060	0.595	5.11	0.0	7.54	12061.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
196.5 (644.7)	34210. (714.5)	0.31E 07	-0.057	1.126	10.41	-0.00123	1.926	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.543	5.112	0	0.249	19	0.029	272	0.001	117	0.004	38	0.001	305	0.023	132	0.019	155	0.000	223
CN		0.752	0.247	14	0.146	56	0.033	15	0.022	29	0.021	343	0.017	246	0.007	110	0.001	128	0.001	243
CM		-0.087	0.028	222	0.024	101	0.005	16	0.004	101	0.004	59	0.004	10	0.002	286	0.001	328	0.001	198
DCP 1	.010	2.993	1.259	350	0.601	62	0.087	33	0.060	31	0.032	328	0.019	240	0.008	135	0.006	70	0.014	180
DCP 2	.020	2.943	1.251	354	0.464	66	0.115	17	0.061	46	0.062	341	0.024	330	0.020	296	0.010	337	0.014	207
DCP 3	.030	2.909	1.137	353	0.386	66	0.113	21	0.051	44	0.079	344	0.026	329	0.030	293	0.011	5	0.010	199
DCP 4	.049	2.217	0.416	336	0.664	84	0.207	38	0.032	49	0.100	24	0.076	329	0.061	280	0.013	352	0.025	280
DCP 5	.074	2.082	0.229	328	0.695	81	0.138	53	0.060	87	0.109	44	0.058	309	0.005	316	0.037	7	0.029	274
DCP 6	.099	1.908	0.137	354	0.676	76	0.093	78	0.120	77	0.080	50	0.020	305	0.018	94	0.030	32	0.012	267
DCP 7	.149	1.504	0.305	18	0.564	72	0.092	20	0.203	55	0.098	87	0.021	13	0.104	188	0.031	145	0.036	119
DCP 8	.200	1.206	0.386	16	0.339	67	0.173	357	0.057	48	0.099	339	0.024	320	0.006	22	0.030	33	0.002	26
DCP 9	.250	1.068	0.399	16	0.262	51	0.144	348	0.035	344	0.097	325	0.052	259	0.025	291	0.025	283	0.023	259
DCP10	.300	0.907	0.347	19	0.177	38	0.091	345	0.030	310	0.064	317	0.049	244	0.011	265	0.024	240	0.017	223
DCP11	.399	0.758	0.311	24	0.119	23	0.029	329	0.025	312	0.034	304	0.043	235	0.008	162	0.018	229	0.007	161
DCP12	.501	0.564	0.250	23	0.072	3	0.008	221	0.008	314	0.019	279	0.024	228	0.014	137	0.005	108	0.001	243
DCP13	.600	0.455	0.199	30	0.061	341	0.017	170	0.010	330	0.010	240	0.017	209	0.014	92	0.005	169	0.009	38
DCP14	.701	0.378	0.131	40	0.050	308	0.032	153	0.009	335	0.005	178	0.012	18	0.011	91	0.004	75	0.005	357
DCP15	.800	0.206	0.129	29	0.053	294	0.014	166	0.009	301	0.011	240	0.015	175	0.010	77	0.004	132	0.005	2
DCP16	.900	-0.034	0.122	9	0.046	284	0.003	163	0.014	309	0.014	249	0.011	186	0.006	116	0.008	93	0.003	16
DCP17	.969	-0.071	0.044	10	0.022	283	0.002	357	0.008	331	0.003	197	0.007	188	0.005	163	0.007	117	0.004	4

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.060	0.594	4.88	0.0	10.04	12061.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
196.1 (643.4)	34143. (713.1)	0.31E 07	-0.081	1.078	10.12	-0.00137	2.148	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.039	4.880	0	0.259	9	0.053	211	0.008	13	0.023	86	0.007	12	0.045	132	0.029	195	0.006	96
CN		0.849	0.132	58	0.008	61	0.038	136	0.013	66	0.007	150	0.008	340	0.006	164	0.005	192	0.002	210
CM		-0.016	0.053	200	0.018	99	0.006	173	0.004	106	0.001	210	0.004	123	0.001	359	0.001	30	0.001	96
DCP 1	.010	3.305	0.255	356	0.438	73	0.145	128	0.063	93	0.029	55	0.033	26	0.025	351	0.019	345	0.007	318
DCP 2	.020	2.962	0.412	356	0.445	79	0.135	131	0.073	88	0.052	125	0.014	95	0.005	343	0.007	112	0.003	348
DCP 3	.030	2.835	0.338	356	0.466	83	0.109	111	0.064	64	0.058	121	0.005	73	0.008	238	0.003	131	0.009	289
DCP 4	.049	2.358	0.446	185	0.481	87	0.161	173	0.169	109	0.041	126	0.064	148	0.038	94	0.027	288	0.018	155
DCP 5	.074	2.199	0.601	175	0.350	83	0.199	176	0.127	106	0.036	188	0.051	127	0.004	165	0.017	179	0.012	221
DCP 6	.099	2.060	0.632	166	0.248	80	0.236	166	0.054	113	0.044	204	0.014	143	0.001	220	0.018	227	0.008	298
DCP 7	.149	1.770	0.537	150	0.195	80	0.214	152	0.038	191	0.057	270	0.041	22	0.015	236	0.018	328	0.007	290
DCP 8	.200	1.337	0.197	81	0.346	73	0.169	147	0.073	83	0.045	150	0.006	294	0.010	265	0.015	308	0.006	7
DCP 9	.250	1.160	0.238	46	0.232	61	0.048	101	0.072	32	0.028	117	0.013	18	0.025	142	0.026	149	0.014	136
DCP10	.300	0.998	0.243	43	0.145	50	0.033	71	0.052	24	0.008	84	0.015	5	0.011	100	0.020	125	0.012	89
DCP11	.399	0.846	0.256	41	0.089	33	0.024	49	0.024	4	0.011	113	0.020	352	0.008	161	0.015	154	0.011	90
DCP12	.501	0.646	0.240	37	0.047	5	0.026	49	0.022	319	0.005	151	0.014	324	0.011	133	0.006	28	0.005	251
DCP13	.600	0.530	0.229	35	0.044	323	0.023	9	0.021	259	0.003	149	0.015	311	0.008	179	0.005	215	0.008	231
DCP14	.701	0.436	0.178	32	0.058	273	0.008	35	0.010	227	0.003	77	0.016	299	0.012	197	0.008	240	0.009	229
DCP15	.800	0.263	0.181	23	0.049	275	0.008	6	0.005	283	0.002	265	0.012	304	0.006	230	0.010	216	0.007	255
DCP16	.900	0.014	0.161	8	0.032	276	0.012	4	0.006	285	0.011	39	0.011	284	0.002	127	0.008	213	0.004	254
DCP17	.969	-0.050	0.064	7	0.011	263	0.009	349	0.004	204	0.004	11	0.008	283	0.004	131	0.004	260	0.003	243

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.05	0.060	0.594	5.03	0.0	11.94	12061.6	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
195.9 (642.7)	34057. (711.3)	0.31E 07	-0.106	1.135	11.49	-0.00851	2.359	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		11.941	5.081	0	0.207	9	0.047	216	0.006	192	0.015	0	0.010	358	0.010	144	0.015	156	0.006	311
CN		0.908	0.145	85	0.033	76	0.042	142	0.008	262	0.018	137	0.007	207	0.010	103	0.001	96	0.003	78
CM		-0.032	0.006	196	0.005	216	0.000	185	0.001	193	0.002	277	0.002	341	0.003	271	0.003	271	0.001	172
DCP 1	.010	3.564	0.116	141	0.188	83	0.133	149	0.038	186	0.030	138	0.014	214	0.021	141	0.006	193	0.012	184
DCP 2	.020	3.117	0.037	124	0.219	90	0.121	161	0.034	180	0.034	186	0.016	215	0.011	171	0.013	246	0.012	208
DCP 3	.030	2.942	0.131	167	0.265	91	0.103	163	0.035	160	0.029	212	0.021	188	0.002	102	0.011	295	0.006	288
DCP 4	.049	2.349	0.742	174	0.101	86	0.237	177	0.029	231	0.079	172	0.033	276	0.042	153	0.035	309	0.021	204
DCP 5	.074	2.146	0.765	169	0.000	330	0.200	174	0.038	263	0.093	158	0.028	255	0.017	160	0.019	291	0.006	124
DCP 6	.099	1.986	0.701	163	0.064	262	0.144	170	0.031	274	0.029	156	0.014	298	0.022	119	0.011	229	0.001	236
DCP 7	.149	1.695	0.524	148	0.038	242	0.112	151	0.026	278	0.025	87	0.024	188	0.012	204	0.012	299	0.007	42
DCP 8	.200	1.435	0.349	132	0.064	92	0.127	152	0.017	234	0.030	135	0.011	225	0.009	163	0.004	308	0.009	126
DCP 9	.250	1.290	0.298	118	0.049	111	0.115	150	0.031	258	0.027	165	0.006	298	0.015	149	0.016	258	0.007	61
DCP10	.300	1.109	0.231	91	0.069	91	0.089	138	0.013	237	0.021	172	0.007	332	0.018	149	0.009	279	0.015	108
DCP11	.399	0.933	0.248	61	0.068	75	0.065	124	0.005	232	0.029	133	0.006	182	0.016	108	0.011	112	0.016	107
DCP12	.501	0.731	0.259	43	0.050	66	0.039	63	0.010	324	0.021	109	0.012	219	0.017	97	0.006	204	0.010	63
DCP13	.600	0.585	0.262	34	0.022	26	0.027	41	0.009	351	0.020	97	0.006	236	0.009	60	0.007	117	0.007	37
DCP14	.701	0.489	0.247	24	0.017	16	0.032	354	0.011	355	0.011	121	0.014	178	0.017	56	0.013	96	0.004	330
DCP15	.800	0.330	0.236	15	0.009	36	0.025	350	0.004	219	0.004	137	0.009	146	0.016	47	0.016	65	0.012	317
DCP16	.900	0.082	0.189	7	0.023	45	0.014	332	0.008	157	0.000	99	0.012	149	0.011	41	0.007	70	0.004	237
DCP17	.969	-0.020	0.077	4	0.016	64	0.002	29	0.004	317	0.003	179	0.008	174	0.003	23	0.006	116	0.002	236

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.060	0.594	5.01	0.0	14.87	12061.7	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.0 (643.0)	[illegible] (7,[illegible])	0.31E 07	-0.115	1.095	12.17	-0.00183	2.355	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.868	5.011	0	0.197	2	0.038	267	0.017	221	0.039	42	0.023	94	0.024	227	0.004	320	0.004	36
CN		0.946	0.146	85	0.022	242	0.009	104	0.015	174	0.006	283	0.006	345	0.005	257	0.000	2	0.003	224
CM		-0.057	0.057	203	0.015	253	0.001	276	0.003	289	0.003	61	0.003	144	0.001	58	0.003	176	0.001	41
DCP 1	.010	3.609	0.333	160	0.080	275	0.050	181	0.033	245	0.011	330	0.001	155	0.010	325	0.009	219	0.008	107
DCP 2	.020	3.139	0.338	165	0.059	299	0.043	200	0.016	252	0.008	353	0.003	156	0.004	207	0.012	288	0.007	167
DCP 3	.030	2.934	0.398	170	0.059	312	0.005	196	0.010	262	0.016	171	0.008	68	0.009	207	0.016	287	0.004	90
DCP 4	.049	2.178	0.683	167	0.075	274	0.067	183	0.009	253	0.048	46	0.021	180	0.011	33	0.008	140	0.014	248
DCP 5	.074	1.947	0.952	162	0.206	267	0.041	88	0.015	228	0.022	44	0.012	84	0.009	342	0.008	118	0.012	299
DCP 6	.099	1.791	0.428	152	0.204	257	0.028	72	0.038	217	0.016	34	0.002	213	0.004	7	0.005	127	0.011	187
DCP 7	.149	1.598	0.335	139	0.176	245	0.012	26	0.038	186	0.012	45	0.017	123	0.010	199	0.015	265	0.008	297
DCP 8	.200	1.436	0.277	117	0.132	244	0.007	88	0.024	200	0.006	97	0.011	129	0.004	267	0.007	235	0.005	320
DCP 9	.250	1.331	0.235	109	0.111	229	0.015	305	0.028	179	0.018	310	0.016	47	0.009	281	0.020	25	0.005	140
DCP10	.300	1.171	0.213	90	0.091	207	0.004	315	0.038	170	0.023	277	0.018	4	0.004	56	0.013	23	0.010	91
DCP11	.399	1.000	0.214	72	0.082	159	0.019	71	0.021	152	0.021	297	0.014	17	0.010	276	0.023	37	0.002	276
DCP12	.501	0.812	0.227	55	0.053	113	0.012	112	0.017	157	0.019	261	0.011	355	0.008	309	0.012	357	0.001	94
DCP13	.600	0.667	0.251	43	0.060	80	0.017	111	0.013	146	0.010	237	0.011	321	0.006	224	0.013	10	0.010	290
DCP14	.701	0.579	0.228	28	0.063	70	0.011	130	0.016	115	0.008	223	0.017	319	0.004	292	0.013	348	0.004	282
DCP15	.800	0.431	0.214	21	0.050	57	0.004	136	0.011	113	0.006	249	0.010	307	0.004	282	0.011	321	0.004	180
DCP16	.900	0.159	0.152	17	0.039	41	0.002	290	0.006	71	0.007	285	0.012	324	0.001	121	0.006	359	0.007	199
DCP17	.969	0.007	0.063	22	0.019	35	0.003	9	0.004	124	0.004	333	0.006	290	0.003	316	0.006	350	0.[illegible]	232

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.83	0.119	0.992	5.18	0.0	12.54	12067.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
195.5 (641.4)	101037. (2110.2)	0.93E 07	-0.116	1.410	12.66	-0.00140	2.220	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.542	5.185	0	0.275	3	0.195	185	0.083	52	0.053	18	0.028	62	0.029	198	0.011	115	0.012	42
CN		0.997	0.284	79	0.055	97	0.048	101	0.019	126	0.006	85	0.007	123	0.003	125	0.006	56	0.005	346
CM		-0.028	0.075	209	0.005	196	0.017	181	0.008	207	0.004	184	0.004	222	0.001	199	0.003	215	0.002	157
DCP 1	.010	3.441	0.254	152	0.219	88	0.167	152	0.084	93	0.039	157	0.024	107	0.039	127	0.025	86	0.030	79
DCP 2	.020	3.220	0.220	159	0.250	102	0.180	168	0.098	121	0.042	192	0.040	157	0.038	179	0.042	166	0.033	145
DCP 3	.030	3.209	0.176	111	0.264	85	0.143	155	0.094	96	0.020	160	0.029	92	0.014	139	0.010	42	0.010	188
DCP 4	.049	2.783	0.531	154	0.176	79	0.244	162	0.035	137	0.084	170	0.018	206	0.047	181	0.017	222	0.030	176
DCP 5	.074	2.596	0.637	147	0.084	57	0.249	153	0.069	225	0.071	152	0.056	237	0.025	186	0.031	232	0.018	264
DCP 6	.099	2.370	0.897	152	0.020	179	0.245	143	0.122	215	0.033	116	0.070	226	0.016	236	0.012	197	0.021	297
DCP 7	.149	2.018	0.857	135	0.199	198	0.082	113	0.075	189	0.016	309	0.021	291	0.016	340	0.019	34	0.012	8
DCP 8	.200	1.553	0.540	105	0.191	129	0.144	149	0.067	206	0.012	270	0.009	198	0.006	85	0.002	129	0.004	269
DCP 9	.250	1.388	0.453	79	0.173	87	0.145	115	0.064	168	0.012	90	0.028	126	0.005	57	0.012	77	0.015	169
DCP10	.300	1.195	0.441	67	0.168	92	0.125	110	0.071	154	0.015	192	0.023	211	0.020	246	0.021	308	0.012	33
DCP11	.399	0.985	0.425	58	0.088	75	0.076	67	0.058	110	0.032	99	0.040	143	0.019	131	0.019	142	0.004	71
DCP12	.501	0.782	0.382	48	0.038	78	0.051	34	0.045	88	0.016	58	0.035	117	0.023	82	0.014	102	0.009	12
DCP13	.600	0.632	0.354	47	0.012	53	0.051	23	0.038	52	0.017	5	0.023	79	0.016	97	0.019	50	0.009	25
DCP14	.701	0.527	0.284	45	0.012	237	0.059	359	0.030	19	0.012	340	0.027	35	0.014	328	0.009	65	0.014	353
DCP15	.800	0.333	0.259	36	0.013	6	0.058	357	0.032	14	0.021	4	0.020	345	0.008	359	0.014	8	0.010	338
DCP16	.900	0.053	0.199	25	0.036	26	0.044	357	0.030	354	0.010	333	0.018	12	0.009	268	0.015	22	0.012	298
DCP17	.969	-0.023	0.081	27	0.023	49	0.022	28	0.021	357	0.003	52	0.010	352	0.003	223	0.012	2	0.010	281

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.88	0.121	0.587	5.15	0.0	15.09	12067.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
193.6 (635.3)	99778. (2083.9)	0.92E 07	-0.116	1.297	13.20	-0.00167	2.618	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.092	5.153	0	0.237	1	0.051	277	0.074	120	0.004	82	0.015	35	0.019	221	0.008	96	0.001	205
CN		1.041	0.256	78	0.034	186	0.013	186	0.007	217	0.005	239	0.001	352	0.003	317	0.003	256	0.002	98
CM		-0.042	0.077	213	0.012	250	0.004	341	0.003	282	0.002	335	0.000	28	0.002	90	0.002	96	0.001	304
DCP 1	.010	3.488	0.520	145	0.103	55	0.125	159	0.036	228	0.046	120	0.024	118	0.011	105	0.024	224	0.015	175
DCP 2	.020	3.373	0.468	148	0.075	76	0.130	175	0.053	248	0.048	171	0.026	266	0.007	81	0.024	266	0.009	238
DCP 3	.030	3.031	0.622	171	0.037	96	0.134	191	0.048	270	0.006	174	0.019	349	0.009	58	0.020	62	0.009	213
DCP 4	.049	2.743	0.634	155	0.244	268	0.068	155	0.121	282	0.044	336	0.010	264	0.032	42	0.010	163	0.019	68
DCP 5	.074	2.543	0.993	147	0.295	256	0.044	10	0.052	259	0.047	339	0.030	82	0.012	102	0.009	140	0.012	191
DCP 6	.099	2.346	0.581	144	0.279	238	0.079	345	0.007	176	0.011	319	0.034	34	0.024	136	0.011	223	0.007	338
DCP 7	.149	1.945	0.385	119	0.145	206	0.027	1	0.016	165	0.029	309	0.015	125	0.009	351	0.031	177	0.016	15
DCP 8	.200	1.606	0.336	113	0.110	203	0.026	291	0.020	198	0.021	278	0.009	350	0.003	77	0.012	168	0.010	295
DCP 9	.250	1.467	0.344	95	0.128	187	0.021	275	0.009	141	0.017	230	0.012	20	0.005	352	0.010	337	0.014	44
DCP10	.300	1.300	0.338	81	0.092	168	0.031	228	0.012	281	0.019	267	0.010	276	0.008	332	0.007	19	0.002	316
DCP11	.399	1.097	0.384	69	0.069	151	0.017	203	0.015	226	0.021	196	0.005	204	0.006	138	0.015	56	0.010	342
DCP12	.501	0.865	0.377	55	0.054	115	0.031	168	0.007	193	0.010	191	0.010	286	0.011	307	0.001	58	0.014	163
DCP13	.600	0.683	0.356	47	0.045	96	0.025	161	0.018	175	0.005	84	0.005	350	0.021	330	0.019	334	0.006	181
DCP14	.701	0.555	0.308	39	0.026	77	0.010	181	0.011	73	0.013	147	0.011	189	0.011	261	0.016	278	0.011	147
DCP15	.800	0.383	0.295	34	0.038	50	0.014	161	0.013	87	0.001	294	0.005	186	0.006	255	0.011	233	0.007	86
DCP16	.900	0.104	0.207	37	0.036	31	0.016	142	0.007	107	0.007	166	0.007	62	0.007	189	0.014	226	0.009	42
DCP17	.969	-0.008	0.090	50	0.022	27	0.013	141	0.004	35	0.006	48	0.004	2	0.005	159	0.003	196	0.004	86

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.87	0.122	0.583	5.18	0.0	17.53	12067.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
191.9 (629.5)	98427. (2055.7)	0.92E 07	-0.148	1.329	17.60	-0.00184	2.861	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.528	5.182	0	0.246	5	0.056	292	0.074	110	0.010	94	0.024	54	0.023	203	0.016	136	0.003	1
CN		1.043	0.288	73	0.017	186	0.001	82	0.010	160	0.002	223	0.004	66	0.003	148	0.001	317	0.006	131
CM		-0.074	0.075	218	0.009	235	0.004	327	0.002	297	0.001	264	0.002	224	0.000	248	0.001	217	0.001	310
DCP 1	.010	2.922	0.829	151	0.178	243	0.044	80	0.055	241	0.031	304	0.021	143	0.013	227	0.010	103	0.011	35
DCP 2	.020	2.837	0.721	150	0.177	247	0.043	340	0.067	242	0.023	319	0.022	176	0.021	301	0.004	286	0.010	72
DCP 3	.030	3.041	0.639	154	0.126	299	0.019	146	0.001	170	0.028	15	0.033	148	0.006	185	0.022	201	0.022	160
DCP 4	.049	2.374	0.506	129	0.162	257	0.100	17	0.024	109	0.016	285	0.004	3	0.022	195	0.013	4	0.028	86
DCP 5	.074	2.154	0.419	121	0.093	244	0.050	10	0.035	128	0.014	225	0.018	346	0.008	28	0.014	346	0.017	83
DCP 6	.099	2.008	0.397	115	0.080	233	0.031	15	0.013	150	0.029	212	0.015	298	0.012	116	0.025	267	0.017	135
DCP 7	.149	1.794	0.380	99	0.092	199	0.037	327	0.018	131	0.007	145	0.004	289	0.014	146	0.013	291	0.010	59
DCP 8	.200	1.549	0.349	96	0.085	188	0.021	304	0.014	230	0.002	353	0.020	159	0.002	46	0.023	156	0.002	314
DCP 9	.250	1.448	0.320	82	0.069	175	0.029	260	0.012	181	0.006	130	0.004	103	0.025	153	0.008	233	0.010	247
DCP10	.300	1.307	0.334	73	0.044	170	0.011	281	0.012	179	0.006	348	0.008	150	0.004	116	0.003	84	0.011	138
DCP11	.399	1.145	0.374	68	0.044	158	0.025	203	0.017	232	0.011	213	0.005	138	0.005	231	0.002	135	0.011	242
DCP12	.501	0.949	0.372	56	0.030	100	0.014	183	0.015	201	0.017	251	0.009	9	0.006	258	0.003	351	0.005	191
DCP13	.600	0.786	0.367	51	0.027	89	0.012	147	0.009	146	0.001	306	0.007	92	0.005	113	0.006	0	0.009	124
DCP14	.701	0.670	0.340	45	0.032	55	0.018	121	0.015	143	0.002	335	0.010	24	0.002	245	0.006	358	0.009	117
DCP15	.800	0.497	0.310	41	0.033	36	0.011	119	0.018	98	0.015	88	0.013	44	0.010	65	0.010	90	0.013	127
DCP16	.900	0.176	0.226	44	0.027	9	0.014	99	0.013	85	0.006	68	0.011	42	0.003	92	0.004	293	0.005	63
DCP17	.969	0.017	0.101	56	0.018	359	0.010	137	0.008	106	0.010	78	0.003	74	0.001	248	0.002	319	0.002	97

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.78	0.119	0.591	5.27	0.0	9.96	12065.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TAR	EXT DAMP
195.3 (640.8)	100774. (2104.7)	0.93F 07	-0.118	1.469	12.50	-0.00130	2.050	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.960	5.272	0	0.283	23	0.105	116	0.224	269	0.030	309	0.009	359	0.024	177	0.008	226	0.014	51
CN		0.910	0.302	58	0.149	44	0.051	35	0.034	353	0.014	332	0.012	311	0.006	224	0.003	293	0.006	89
CM		-0.014	0.055	222	0.025	113	0.013	145	0.011	87	0.006	79	0.006	34	0.004	5	0.002	347	0.003	292
DCP 1	.010	3.155	0.383	357	0.525	69	0.098	61	0.017	50	0.032	2	0.031	329	0.038	292	0.014	227	0.012	257
DCP 2	.020	2.989	0.431	7	0.592	76	0.096	44	0.071	60	0.041	48	0.025	311	0.044	333	0.043	251	0.025	273
DCP 3	.030	2.967	0.561	1	0.504	78	0.127	34	0.069	43	0.047	51	0.038	2	0.018	330	0.036	253	0.031	249
DCP 4	.049	2.598	0.260	129	0.595	66	0.031	73	0.172	58	0.040	20	0.060	49	0.040	19	0.029	342	0.041	305
DCP 5	.074	2.479	0.419	135	0.536	60	0.075	28	0.171	50	0.021	29	0.088	29	0.019	8	0.032	26	0.031	332
DCP 6	.099	2.413	0.586	139	0.481	59	0.171	120	0.146	37	0.029	66	0.073	23	0.033	42	0.036	17	0.025	331
DCP 7	.149	1.854	0.574	83	0.536	70	0.292	125	0.034	133	0.018	83	0.028	335	0.011	303	0.033	65	0.011	56
DCP 8	.200	1.441	0.593	62	0.387	71	0.191	67	0.139	67	0.064	102	0.050	85	0.040	179	0.026	170	0.024	160
DCP 9	.250	1.274	0.503	48	0.261	44	0.157	21	0.125	7	0.042	8	0.056	352	0.017	94	0.008	317	0.026	87
DCP10	.300	1.110	0.480	47	0.214	34	0.154	12	0.110	351	0.062	345	0.055	335	0.021	341	0.012	300	0.028	29
DCP11	.399	0.896	0.409	51	0.128	20	0.105	7	0.068	320	0.047	337	0.046	292	0.023	283	0.032	276	0.007	136
DCP12	.501	0.686	0.369	49	0.100	352	0.055	354	0.050	311	0.036	312	0.037	274	0.028	250	0.025	240	0.012	179
DCP13	.600	0.546	0.315	54	0.080	338	0.043	349	0.036	289	0.028	302	0.023	235	0.024	234	0.020	186	0.013	127
DCP14	.701	0.463	0.248	60	0.071	308	0.029	344	0.042	262	0.023	246	0.026	191	0.023	174	0.019	130	0.012	73
DCP15	.800	0.266	0.216	46	0.068	309	0.040	329	0.040	250	0.023	273	0.023	178	0.016	148	0.007	86	0.012	111
DCP16	.900	-0.006	0.163	30	0.065	320	0.046	304	0.028	257	0.021	208	0.020	178	0.018	136	0.007	80	0.012	89
DCP17	.969	-0.054	0.070	30	0.036	333	0.027	325	0.017	292	0.016	253	0.015	239	0.013	169	0.006	121	0.007	146

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.87	0.176	0.603	5.95	0.0	0.02	12069.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA,NMAX	AERO DAMP	TAR	EXT DAMP
199.0 (652.9)	103905. (2170.1)	0.94F 07	-0.062	0.639	6.35	-0.00078	1.280	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.021	5.952	0	0.519	339	0.129	207	0.025	185	0.053	99	0.027	50	0.011	297	0.011	266	0.008	106
CM		0.121	0.515	354	0.028	349	0.009	203	0.005	196	0.006	167	0.003	125	0.001	321	0.001	134	0.001	144
CN		-0.018	0.039	298	0.007	270	0.002	97	0.001	342	0.001	46	0.001	337	0.000	234	0.000	254	0.000	316
DCP 1	.010	-0.807	3.342	336	0.223	246	0.293	258	0.179	304	0.043	318	0.041	288	0.042	316	0.019	260	0.039	264
DCP 2	.020	-0.584	2.636	342	0.131	313	0.104	269	0.113	332	0.083	61	0.035	51	0.047	357	0.054	68	0.017	156
DCP 3	.030	-0.308	2.366	341	0.137	352	0.028	151	0.070	301	0.071	65	0.051	110	0.021	185	0.016	88	0.027	145
DCP 4	.049	0.103	2.145	342	0.114	346	0.111	119	0.052	201	0.025	83	0.027	75	0.031	182	0.008	279	0.007	194
DCP 5	.074	0.329	1.830	342	0.125	306	0.123	111	0.049	158	0.035	193	0.017	347	0.009	176	0.009	190	0.009	306
DCP 6	.099	0.456	1.588	344	0.168	279	0.134	130	0.047	83	0.044	226	0.001	317	0.022	311	0.018	196	0.016	46
DCP 7	.149	0.246	0.959	346	0.084	349	0.026	292	0.030	167	0.032	126	0.009	319	0.013	254	0.001	260	0.002	203
DCP 8	.200	0.196	0.787	355	0.051	344	0.021	277	0.015	187	0.012	152	0.005	43	0.004	24	0.003	90	0.000	286
DCP 9	.250	0.189	0.665	352	0.046	340	0.021	247	0.008	193	0.009	139	0.002	113	0.003	53	0.004	51	0.002	350
DCP10	.300	0.194	0.562	354	0.041	348	0.018	244	0.006	202	0.007	147	0.001	38	0.002	24	0.002	116	0.003	67
DCP11	.399	0.168	0.447	8	0.036	14	0.018	271	0.006	229	0.006	212	0.005	135	0.001	178	0.003	192	0.002	74
DCP12	.501	0.131	0.340	14	0.033	29	0.009	268	0.005	228	0.007	198	0.006	124	0.002	38	0.003	185	0.002	168
DCP13	.600	0.146	0.254	22	0.030	43	0.009	258	0.003	233	0.007	228	0.005	146	0.001	149	0.001	95	0.003	189
DCP14	.701	0.227	0.171	29	0.028	56	0.005	243	0.004	109	0.003	216	0.006	143	0.002	349	0.003	59	0.001	182
DCP15	.800	0.097	0.103	50	0.020	82	0.004	224	0.003	211	0.003	256	0.007	176	0.003	20	0.001	111	0.003	78
DCP16	.900	-0.096	0.055	105	0.022	134	0.007	197	0.004	156	0.006	172	0.004	137	0.001	198	0.001	71	0.002	109
DCP17	.969	-0.050	0.046	163	0.010	139	0.006	147	0.001	161	0.002	187	0.003	178	0.004	37	0.002	65	0.004	233

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.87	0.177	0.600	5.99	0.0	2.47	12069.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
197.7 (648.5)	102990. (2151.0)	0.93E 07	-0.043	0.947	8.75	-0.00078	1.263	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.468	5.985 0	0.499 347	0.190 140	0.031 163	0.021 96	0.011 64	0.013 228	0.013 131	0.003 252
CN		0.397	0.517 353	0.038 332	0.013 200	0.003 358	0.004 234	0.001 197	0.002 234	0.002 111	0.002 77
CM		-0.006	0.039 299	0.008 224	0.003 110	0.001 109	0.001 71	0.000 240	0.000 120	0.000 149	0.000 353
DCP 1	.010	0.574	3.122 333	0.284 7	0.069 90	0.091 158	0.032 94	0.007 208	0.012 118	0.011 210	0.010 279
DCP 2	.020	0.791	2.448 341	0.098 304	0.019 237	0.035 355	0.027 91	0.008 94	0.023 218	0.014 146	0.004 344
DCP 3	.030	0.909	2.174 340	0.086 311	0.027 159	0.023 2	0.006 175	0.008 344	0.021 237	0.015 137	0.006 6
DCP 4	.049	1.164	1.935 340	0.051 329	0.027 270	0.005 27	0.024 254	0.015 152	0.007 222	0.016 110	0.012 349
DCP 5	.074	1.252	1.759 341	0.064 281	0.033 278	0.026 197	0.009 265	0.027 159	0.016 24	0.004 191	0.014 350
DCP 6	.099	1.311	1.698 342	0.146 251	0.019 310	0.077 208	0.033 84	0.031 191	0.038 61	0.014 284	0.015 59
DCP 7	.149	0.965	1.420 346	0.299 257	0.203 145	0.087 39	0.020 13	0.052 310	0.049 212	0.019 104	0.016 168
DCP 8	.200	0.616	0.911 355	0.087 315	0.062 172	0.048 32	0.033 279	0.013 183	0.009 249	0.013 125	0.009 357
DCP 9	.250	0.519	0.643 352	0.048 352	0.010 169	0.029 326	0.034 210	0.022 111	0.015 351	0.003 245	0.004 142
DCP10	.300	0.448	0.507 356	0.083 9	0.028 264	0.012 235	0.015 154	0.006 52	0.007 272	0.005 127	0.003 46
DCP11	.399	0.385	0.421 9	0.067 20	0.023 275	0.005 255	0.005 221	0.002 226	0.003 306	0.001 96	0.003 97
DCP12	.501	0.293	0.323 15	0.049 18	0.017 271	0.004 258	0.005 237	0.003 278	0.001 220	0.003 141	0.002 178
DCP13	.600	0.262	0.246 23	0.041 21	0.012 264	0.001 264	0.007 257	0.001 69	0.001 150	0.001 315	0.004 118
DCP14	.701	0.299	0.162 34	0.040 23	0.013 266	0.001 210	0.004 267	0.004 99	0.002 186	0.003 24	0.003 120
DCP15	.800	0.130	0.100 49	0.023 26	0.008 256	0.003 34	0.002 204	0.002 77	0.001 342	0.003 1	0.003 249
DCP16	.900	-0.101	0.034 73	0.006 39	0.006 320	0.004 306	0.003 247	0.001 340	0.001 218	0.003 98	0.001 34
DCP17	.969	-0.067	0.031 179	0.006 221	0.004 127	0.005 288	0.004 1	0.003 203	0.001 68	0.003 325	0.002 320

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.88	0.178	0.597	5.90	0.0	4.99	12069.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.7 (645.2)	102315. (2136.9)	0.93E 07	-0.039	1.229	11.21	-0.00080	1.286	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.987	5.902 0	0.654 3	0.263 148	0.043 186	0.023 51	0.016 344	0.023 204	0.024 202	0.008 358
CN		0.605	0.509 7	0.095 313	0.054 172	0.015 18	0.003 232	0.003 191	0.005 59	0.002 317	0.002 199
CM		-0.000	0.041 294	0.013 68	0.014 294	0.011 156	0.005 35	0.001 344	0.001 236	0.001 80	0.001 359
DCP 1	.010	1.960	2.439 339	0.268 34	0.023 310	0.050 200	0.011 274	0.029 126	0.006 303	0.008 67	0.013 339
DCP 2	.020	1.764	2.203 346	0.179 27	0.010 226	0.062 211	0.036 69	0.019 208	0.020 98	0.011 29	0.010 16
DCP 3	.030	1.914	2.009 345	0.079 0	0.025 148	0.051 219	0.038 92	0.011 166	0.024 67	0.010 357	0.014 45
DCP 4	.049	1.871	1.619 347	0.255 25	0.128 252	0.099 154	0.097 49	0.048 285	0.024 139	0.026 336	0.007 223
DCP 5	.074	1.828	1.428 350	0.298 10	0.198 257	0.137 141	0.091 17	0.038 268	0.006 281	0.015 257	0.026 142
DCP 6	.099	1.747	1.314 356	0.353 10	0.272 266	0.166 140	0.115 346	0.031 171	0.044 311	0.045 180	0.001 86
DCP 7	.149	1.300	1.167 5	0.395 316	0.200 224	0.091 209	0.089 151	0.060 197	0.056 49	0.021 336	0.013 35
DCP 8	.200	1.030	0.962 8	0.295 306	0.184 195	0.046 124	0.040 126	0.033 60	0.021 7	0.014 1	0.013 287
DCP 9	.250	0.866	0.771 3	0.189 281	0.155 155	0.058 45	0.017 49	0.035 342	0.033 253	0.017 166	0.006 91
DCP10	.300	0.746	0.633 4	0.151 276	0.139 149	0.069 29	0.029 335	0.035 275	0.028 183	0.016 71	0.005 139
DCP11	.399	0.587	0.479 20	0.093 292	0.097 148	0.070 17	0.030 280	0.017 235	0.025 157	0.022 60	0.014 289
DCP12	.501	0.431	0.369 27	0.065 289	0.068 133	0.058 355	0.028 246	0.015 193	0.019 97	0.012 350	0.011 227
DCP13	.600	0.344	0.288 41	0.061 301	0.054 131	0.055 343	0.031 224	0.014 147	0.016 60	0.015 307	0.014 206
DCP14	.701	0.336	0.214 59	0.056 309	0.044 120	0.042 326	0.025 182	0.005 45	0.007 13	0.011 241	0.005 157
DCP15	.800	0.154	0.144 60	0.039 273	0.035 133	0.028 310	0.013 169	0.002 157	0.009 22	0.012 .95	0.007 123
DCP16	.900	-0.091	0.066 53	0.039 236	0.032 79	0.018 301	0.008 195	0.002 174	0.006 326	0.010 196	0.004 72
DCP17	.969	-0.080	0.018 142	0.027 248	0.017 88	0.008 305	0.004 265	0.006 141	0.010 358	0.006 260	0.002 121

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.91	0.181	0.599	5.80	0.0	7.48	12069.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
193.9 (636.1)	99806. (2084.5)	0.92E 07	-0.137	1.491	13.41	-0.00062	0.988	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.477	5.900 0	0.784 17	0.356 164	0.059 161	0.022 56	0.012 331	0.016 315	0.016 189	0.019 317
CN		0.778	0.497 28	0.167 332	0.066 221	0.015 165	0.013 51	0.012 280	0.009 189	0.005 106	0.006 345
CM		-0.011	0.047 237	0.042 75	0.025 324	0.011 248	0.010 196	0.008 98	0.005 10	0.003 278	0.003 189
DCP 1	.010	2.551	1.526 340	0.545 43	0.192 301	0.105 196	0.052 76	0.039 350	0.022 301	0.036 265	0.036 176
DCP 2	.020	2.388	1.436 [illegible]	0.434 48	0.233 313	0.160 218	0.031 80	0.006 164	0.029 8	0.029 314	0.034 244
DCP 3	.030	2.376	1.345 356	0.343 43	0.207 315	0.154 222	0.014 69	0.029 191	0.014 95	0.023 327	0.042 254
DCP 4	.049	2.288	0.878 4	0.581 39	0.251 291	0.157 207	0.015 295	0.091 173	0.067 61	0.091 306	0.015 230
DCP 5	.074	2.196	0.778 12	0.627 34	0.247 274	0.060 184	0.051 253	0.098 155	0.074 48	0.014 248	0.014 18
DCP 6	.099	2.092	0.785 23	0.696 33	0.297 269	0.092 43	0.114 216	0.057 115	0.045 84	0.011 116	0.042 358
DCP 7	.149	1.549	1.310 32	0.514 359	0.203 308	0.128 285	0.077 269	0.023 290	0.044 270	0.019 189	0.028 345
DCP 8	.200	1.263	0.888 34	0.425 351	0.199 299	0.132 266	0.084 239	0.050 239	0.049 206	0.043 158	0.019 138
DCP 9	.250	1.091	0.774 24	0.316 318	0.154 228	0.082 205	0.075 142	0.032 76	0.022 132	0.029 47	0.006 300
DCP10	.300	0.957	0.676 23	0.275 306	0.147 209	0.071 175	0.075 112	0.039 45	0.017 56	0.025 353	0.015 264
DCP11	.399	0.790	0.591 33	0.232 307	0.113 237	0.057 160	0.073 102	0.049 23	0.017 327	0.019 314	0.017 252
DCP12	.501	0.586	0.478 36	0.198 296	0.102 187	0.056 118	0.072 60	0.052 331	0.026 261	0.019 226	0.017 175
DCP13	.600	0.469	0.391 43	0.164 287	0.106 166	0.051 87	0.062 28	0.054 292	0.031 227	0.024 167	0.025 75
DCP14	.701	0.425	0.292 52	0.138 274	0.096 143	0.046 55	0.051 1	0.053 264	0.032 187	0.027 119	0.027 30
DCP15	.800	0.221	0.221 44	0.125 260	0.084 133	0.035 39	0.037 342	0.036 244	0.022 151	0.021 83	0.015 357
DCP16	.900	-0.044	0.139 24	0.106 244	0.060 126	0.037 47	0.036 316	0.029 215	0.017 135	0.021 52	0.018 304
DCP17	.969	-0.068	0.041 26	0.056 260	0.032 149	0.021 69	0.022 345	0.015 256	0.016 168	0.014 66	0.016 348

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.75	0.182	0.582	5.71	0.0	10.54	12071.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
192.5 (631.7)	98581. (2058.9)	0.92E 07	-0.193	1.632	15.44	-0.00098	1.545	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		10.539	5.711 0	0.632 34	0.255 210	0.079 204	0.020 108	0.059 93	0.020 211	0.018 299	0.021 118
CN		0.926	0.457 49	0.164 353	0.041 313	0.031 251	0.013 160	0.012 87	0.003 8	0.005 4	0.003 312
CM		-0.023	0.080 219	0.049 99	0.015 57	0.021 13	0.010 285	0.006 260	0.004 208	0.002 144	0.001 129
DCP 1	.010	3.002	0.427 9	0.659 57	0.157 315	0.026 341	0.044 274	0.041 189	0.019 135	0.038 165	0.025 75
DCP 2	.020	2.809	0.527 18	0.597 66	0.175 338	0.058 52	0.052 312	0.028 237	0.012 144	0.031 234	0.040 134
DCP 3	.030	2.688	0.358 24	0.552 69	0.219 350	0.073 16	0.057 299	0.021 203	0.007 147	0.037 218	0.027 127
DCP 4	.049	2.634	0.316 69	0.526 49	0.089 310	0.159 43	0.117 308	0.021 17	0.050 284	0.049 164	0.028 63
DCP 5	.074	2.523	0.360 89	0.514 42	0.024 285	0.162 21	0.100 272	0.042 45	0.048 284	0.020 48	0.034 273
DCP 6	.099	2.453	0.463 102	0.525 39	0.034 137	0.172 2	0.071 244	0.059 9	0.047 252	0.025 26	0.035 247
DCP 7	.149	1.798	0.775 61	0.441 49	0.156 65	0.105 25	0.051 163	0.013 107	0.028 249	0.026 265	0.021 292
DCP 8	.200	1.468	0.701 57	0.356 35	0.169 35	0.132 9	0.048 38	0.052 29	0.014 81	0.028 34	0.019 30
DCP 9	.250	1.295	0.761 44	0.293 354	0.168 346	0.133 291	0.036 285	0.039 276	0.004 298	0.024 322	0.003 222
DCP10	.300	1.113	0.672 42	0.256 342	0.140 327	0.128 268	0.045 240	0.038 239	0.024 206	0.012 86	0.014 305
DCP11	.399	0.929	0.629 49	0.230 336	0.093 322	0.122 265	0.045 219	0.033 211	0.019 175	0.022 161	0.016 140
DCP12	.501	0.728	0.564 46	0.213 316	0.064 288	0.117 238	0.054 171	0.050 149	0.040 99	0.030 66	0.010 43
DCP13	.600	0.593	0.490 47	0.203 302	0.064 249	0.100 207	0.050 129	0.051 115	0.039 57	0.026 25	0.017 346
DCP14	.701	0.504	0.382 50	0.179 290	0.090 226	0.082 188	0.052 108	0.046 75	0.028 10	0.022 328	0.008 281
DCP15	.800	0.298	0.322 39	0.169 281	0.065 219	0.081 159	0.043 73	0.031 39	0.015 333	0.011 287	0.003 75
DCP16	.900	0.006	0.218 23	0.119 276	0.063 226	0.063 149	0.041 69	0.032 26	0.025 317	0.018 254	0.010 232
DCP17	.969	-0.053	0.085 27	0.063 295	0.029 250	0.032 175	0.022 106	0.016 46	0.006 17	0.015 279	0.005 278

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.70	0.185	0.572	5.61	0.0	12.54	12073.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
189.2 (620.9)	95871. (2002.3)	0.91E 07	-0.201	1.721	15.30	-0.00147	2.292	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.537	5.615	0	0.407	22	0.081	268	0.038	268	0.028	38	0.024	234	0.009	244	0.013	149	0.013	318
CN		1.033	0.476	70	0.119	33	0.057	61	0.020	8	0.012	301	0.004	243	0.006	221	0.003	227	0.007	207
CM		-0.029	0.103	219	0.029	139	0.026	131	0.011	110	0.011	81	0.004	74	0.005	54	0.001	355	0.003	17
PCP 1	.010	3.503	0.338	136	0.417	63	0.068	153	0.124	67	0.025	78	0.059	60	0.027	17	0.045	1	0.042	324
PCP 2	.020	3.282	0.284	119	0.428	76	0.099	149	0.130	84	0.018	99	0.053	98	0.027	69	0.035	58	0.034	51
PCP 3	.030	3.090	0.359	129	0.525	75	0.077	105	0.121	68	0.030	31	0.026	45	0.004	237	0.016	40	0.006	9
PCP 4	.049	2.884	0.527	130	0.370	59	0.243	144	0.140	56	0.075	141	0.057	62	0.052	105	0.050	15	0.015	115
PCP 5	.074	2.690	0.685	131	0.297	51	0.286	130	0.091	29	0.106	122	0.017	282	0.075	106	0.017	321	0.034	84
PCP 6	.099	2.561	0.920	134	0.212	48	0.313	113	0.020	341	0.120	102	0.042	201	0.070	82	0.021	194	0.026	50
PCP 7	.149	2.150	0.990	113	0.121	126	0.226	83	0.087	168	0.012	10	0.024	113	0.029	131	0.035	175	0.023	223
PCP 8	.200	1.597	0.812	77	0.335	86	0.247	101	0.103	129	0.030	150	0.058	193	0.013	216	0.020	246	0.015	267
PCP 9	.250	1.411	0.768	61	0.288	55	0.195	61	0.063	58	0.051	69	0.022	128	0.008	120	0.018	301	0.012	102
PCP10	.300	1.236	0.692	56	0.237	47	0.182	37	0.081	48	0.064	16	0.034	66	0.014	327	0.007	131	0.013	155
PCP11	.399	1.020	0.630	61	0.154	33	0.137	22	0.058	17	0.071	350	0.029	5	0.023	320	0.014	2	0.009	295
PCP12	.501	0.804	0.574	55	0.108	10	0.107	0	0.055	353	0.071	316	0.029	319	0.040	287	0.008	264	0.012	273
PCP13	.600	0.653	0.561	56	0.113	341	0.096	337	0.055	315	0.060	292	0.034	289	0.034	272	0.018	285	0.028	239
PCP14	.701	0.551	0.452	54	0.107	321	0.089	307	0.046	284	0.059	248	0.025	245	0.033	219	0.015	189	0.022	201
PCP15	.800	0.357	0.408	43	0.129	320	0.104	290	0.046	265	0.056	221	0.020	194	0.017	180	0.008	153	0.016	185
PCP16	.900	0.056	0.294	33	0.113	324	0.081	284	0.042	270	0.044	201	0.022	223	0.025	150	0.013	115	0.012	69
PCP17	.969	-0.039	0.120	40	0.062	341	0.039	297	0.025	289	0.018	262	0.010	183	0.018	214	0.010	140	0.012	116

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.61	0.188	0.562	5.62	0.0	15.09	12073.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
185.9 (610.0)	93218. (1946.9)	0.90E 07	-0.179	1.681	15.66	-0.00165	2.516	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.090	5.618	0	0.261	349	0.023	190	0.031	81	0.037	47	0.025	4	0.016	178	0.005	153	0.009	72
CN		1.083	0.474	75	0.078	84	0.030	122	0.024	126	0.011	88	0.006	26	0.002	280	0.003	50	0.003	352
CM		-0.043	0.115	216	0.023	206	0.005	177	0.009	234	0.007	226	0.004	211	0.003	213	0.001	209	0.000	213
PCP 1	.010	3.480	0.829	140	0.330	46	0.160	115	0.041	336	0.030	102	0.022	229	0.034	136	0.030	122	0.018	71
PCP 2	.020	3.304	0.840	145	0.270	69	0.218	137	0.022	318	0.066	131	0.022	268	0.021	187	0.026	205	0.016	184
PCP 3	.030	3.221	0.716	150	0.282	73	0.155	155	0.009	202	0.042	128	0.047	294	0.029	191	0.019	273	0.006	310
PCP 4	.049	2.873	0.823	146	0.029	287	0.164	148	0.124	238	0.018	234	0.034	281	0.051	287	0.020	249	0.032	90
PCP 5	.074	2.684	0.872	139	0.128	230	0.105	114	0.134	216	0.054	306	0.015	345	0.042	289	0.027	17	0.026	0
PCP 6	.099	2.524	0.953	132	0.236	211	0.041	69	0.090	191	0.054	265	0.027	327	0.025	210	0.010	212	0.013	331
PCP 7	.149	2.049	0.777	105	0.201	165	0.011	109	0.029	197	0.018	114	0.007	69	0.027	262	0.010	311	0.019	278
PCP 8	.200	1.607	0.647	92	0.159	130	0.043	152	0.051	168	0.015	220	0.012	129	0.009	239	0.006	220	0.010	282
PCP 9	.250	1.568	0.719	83	0.222	117	0.052	153	0.051	160	0.010	194	0.007	344	0.007	257	0.010	43	0.007	341
PCP10	.300	1.377	0.678	72	0.238	100	0.088	126	0.078	135	0.020	181	0.014	147	0.007	147	0.019	67	0.015	82
PCP11	.399	1.124	0.654	67	0.180	91	0.072	134	0.077	135	0.050	161	0.032	192	0.027	215	0.008	179	0.003	216
PCP12	.501	0.868	0.569	56	0.105	70	0.030	125	0.054	95	0.037	110	0.009	79	0.007	99	0.008	134	0.004	238
PCP13	.600	0.697	0.552	52	0.089	50	0.007	82	0.038	71	0.037	93	0.013	78	0.024	83	0.008	147	0.010	23
PCP14	.701	0.592	0.495	45	0.073	22	0.012	343	0.043	48	0.044	35	0.029	35	0.019	31	0.018	56	0.006	202
PCP15	.800	0.414	0.457	40	0.101	14	0.027	334	0.032	17	0.032	22	0.027	11	0.014	11	0.013	325	0.006	341
PCP16	.900	0.107	0.316	38	0.098	0	0.032	15	0.019	9	0.032	3	0.018	352	0.016	314	0.006	328	0.006	16
PCP17	.969	-0.016	0.192	49	0.056	10	0.022	36	0.013	42	0.016	17	0.020	19	0.007	25	0.009	13	0.006	80

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.08	0.052	0.694	4.88	0.0	0.02	12075.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
226.0 (741.5)	127390. (2660.6)	0.10E 08	-0.058	0.807	4.66	-0.00117	2.098	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.016	4.884	0	0.082	349	0.153	344	0.118	153	0.034	326	0.064	96	0.071	317	0.024	132	0.021	229
CN		0.130	0.667	350	0.024	332	0.008	103	0.009	139	0.005	339	0.001	123	0.002	37	0.003	189	0.002	183
CM		-0.022	0.032	332	0.005	60	0.001	54	0.001	324	0.002	113	0.001	142	0.001	240	0.001	357	0.000	67
DCP 1	.010	-0.928	2.696	345	0.180	264	0.308	312	0.029	7	0.108	292	0.031	1	0.039	280	0.036	316	0.008	244
DCP 2	.020	-0.778	2.513	348	0.071	339	0.259	319	0.076	27	0.057	309	0.055	7	0.018	5	0.033	329	0.022	43
DCP 3	.030	-0.606	2.390	347	0.152	37	0.223	321	0.112	31	0.025	341	0.063	11	0.040	59	0.022	347	0.042	56
DCP 4	.049	-0.217	2.282	347	0.245	48	0.156	322	0.120	31	0.049	85	0.028	18	0.067	66	0.029	144	0.034	55
DCP 5	.074	0.025	2.143	346	0.309	49	0.066	330	0.104	24	0.100	86	0.035	156	0.050	48	0.074	133	0.032	208
DCP 6	.099	0.233	2.046	346	0.321	48	0.036	58	0.023	22	0.093	78	0.110	163	0.025	259	0.060	134	0.075	198
DCP 7	.149	0.315	1.836	346	0.204	42	0.132	111	0.171	200	0.028	93	0.128	169	0.073	219	0.067	284	0.034	42
DCP 8	.200	0.406	1.641	350	0.094	265	0.112	124	0.192	207	0.032	200	0.047	334	0.049	80	0.064	333	0.013	17
DCP 9	.250	0.432	1.125	348	0.239	247	0.121	127	0.077	197	0.043	152	0.112	356	0.016	297	0.036	352	0.055	245
DCP10	.300	0.373	0.843	350	0.268	250	0.153	146	0.105	47	0.057	288	0.040	347	0.040	280	0.047	153	0.019	92
DCP11	.399	0.208	0.461	357	0.059	267	0.016	199	0.060	44	0.051	302	0.022	185	0.009	61	0.016	175	0.012	71
DCP12	.501	0.124	0.293	0	0.027	32	0.042	315	0.004	88	0.014	307	0.011	169	0.013	73	0.002	307	0.007	252
DCP13	.600	0.131	0.218	1	0.031	42	0.034	318	0.014	190	0.003	21	0.003	19	0.004	65	0.006	176	0.004	256
DCP14	.701	0.229	0.144	2	0.022	50	0.020	314	0.011	180	0.003	3	0.002	332	0.003	75	0.004	176	0.003	246
DCP15	.800	0.088	0.070	8	0.005	356	0.005	344	0.008	165	0.002	76	0.003	316	0.004	71	0.004	182	0.003	211
DCP16	.900	-0.121	0.006	96	0.009	260	0.005	125	0.005	168	0.003	45	0.003	353	0.003	50	0.005	168	0.003	186
DCP17	.969	-0.058	0.030	184	0.002	245	0.007	122	0.005	172	0.003	91	0.001	314	0.001	279	0.003	194	0.001	14

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	22.37	0.050	0.696	5.16	0.0	2.33	12075.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
226.5 (743.1)	128118. (2675.8)	0.10E 08	-0.038	1.031	7.14	-0.00133	2.387	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.327	5.161	0	0.211	23	0.050	326	0.015	266	0.036	278	0.042	119	0.030	356	0.029	190	0.006	208
CN		0.398	0.581	355	0.088	14	0.045	281	0.019	187	0.005	148	0.009	114	0.006	353	0.002	223	0.001	139
CM		-0.013	0.021	303	0.010	121	0.008	39	0.005	309	0.003	244	0.002	171	0.002	100	0.002	3	0.002	274
DCP 1	.010	0.102	2.610	346	0.395	32	0.054	271	0.094	32	0.055	88	0.050	150	0.003	1	0.012	157	0.022	200
DCP 2	.020	0.172	2.292	349	0.410	40	0.048	160	0.049	78	0.028	77	0.040	165	0.025	255	0.022	300	0.002	240
DCP 3	.030	0.314	2.045	349	0.421	42	0.112	145	0.069	138	0.015	314	0.020	173	0.032	259	0.042	312	0.023	38
DCP 4	.049	0.674	1.756	348	0.396	46	0.101	141	0.071	182	0.084	280	0.061	348	0.037	59	0.006	116	0.019	43
DCP 5	.074	0.946	1.406	349	0.206	39	0.058	296	0.054	38	0.016	91	0.007	231	0.018	53	0.021	132	0.011	185
DCP 6	.099	1.082	1.374	349	0.206	42	0.068	297	0.067	33	0.022	90	0.008	132	0.006	108	0.003	248	0.004	20
DCP 7	.149	1.034	1.374	349	0.152	38	0.123	308	0.037	44	0.049	286	0.018	33	0.031	251	0.030	335	0.012	213
DCP 8	.200	0.937	1.303	351	0.077	23	0.164	319	0.044	211	0.067	294	0.021	136	0.055	280	0.016	186	0.040	248
DCP 9	.250	0.800	1.027	351	0.144	44	0.297	319	0.189	216	0.011	250	0.090	171	0.032	29	0.026	171	0.028	246
DCP10	.300	0.615	0.792	359	0.152	349	0.138	307	0.138	238	0.074	185	0.094	158	0.075	81	0.026	65	0.042	19
DCP11	.399	0.445	0.563	2	0.093	326	0.027	218	0.039	243	0.060	147	0.027	73	0.026	61	0.024	339	0.004	220
DCP12	.501	0.316	0.396	7	0.095	331	0.064	209	0.023	137	0.036	126	0.041	49	0.029	338	0.018	284	0.012	239
DCP13	.600	0.249	0.246	11	0.069	354	0.053	215	0.037	112	0.021	60	0.024	18	0.025	311	0.026	236	0.017	165
DCP14	.701	0.272	0.104	28	0.069	28	0.032	242	0.029	111	0.023	22	0.018	312	0.017	245	0.016	176	0.015	99
DCP15	.800	0.112	0.069	31	0.034	2	0.028	236	0.021	114	0.015	14	0.011	297	0.009	230	0.011	153	0.010	80
DCP16	.900	-0.112	0.029	29	0.030	280	0.024	210	0.020	94	0.014	350	0.011	281	0.009	211	0.012	128	0.010	52
DCP17	.969	-0.069	0.026	173	0.017	272	0.014	225	0.009	97	0.006	329	0.001	250	0.003	233	0.006	139	0.005	63

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.39	0.050	0.698	5.08	0.0	4.95	12075.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
226.3 (742.6)	128075. (2674.9)	0.10E 08	-0.056	1.121	8.37	-0.00177	3.193	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.947	5.075	0	0.199	31	0.028	235	0.039	77	0.049	359	0.013	86	0.032	217	0.034	192	0.000	125
CN		0.637	0.431	4	0.127	34	0.035	359	0.031	307	0.010	216	0.003	292	0.003	296	0.006	227	0.004	148
CM		-0.010	0.024	258	0.015	131	0.005	97	0.007	78	0.004	355	0.001	269	0.000	299	0.001	18	0.001	291
DCP 1	.010	1.283	1.780	350	0.354	36	0.059	49	0.042	238	0.005	355	0.009	243	0.018	257	0.009	251	0.005	65
DCP 2	.020	1.250	1.568	354	0.270	31	0.034	84	0.043	246	0.016	151	0.006	217	0.010	217	0.004	130	0.004	93
DCP 3	.030	1.296	1.374	354	0.219	24	0.029	105	0.044	243	0.021	152	0.007	217	0.011	197	0.006	102	0.003	104
DCP 4	.049	1.501	1.149	354	0.221	31	0.042	123	0.028	230	0.015	130	0.005	156	0.006	244	0.004	95	0.003	38
DCP 5	.074	1.596	1.013	354	0.203	33	0.031	118	0.020	221	0.004	156	0.007	32	0.002	5	0.003	107	0.007	27
DCP 6	.099	1.700	0.967	353	0.220	39	0.049	114	0.028	229	0.005	239	0.007	157	0.005	244	0.006	344	0.010	10
DCP 7	.149	1.577	0.972	351	0.328	52	0.055	77	0.047	309	0.047	124	0.057	160	0.015	314	0.004	115	0.028	205
DCP 8	.200	1.320	0.805	353	0.459	63	0.123	351	0.089	0	0.045	135	0.023	199	0.047	72	0.048	164	0.004	152
DCP 9	.250	1.068	0.610	358	0.439	59	0.117	345	0.215	22	0.061	273	0.091	352	0.015	144	0.014	294	0.027	69
DCP10	.300	0.867	0.580	9	0.228	56	0.186	9	0.107	2	0.096	319	0.067	340	0.054	308	0.056	297	0.023	271
DCP11	.399	0.661	0.470	11	0.073	26	0.100	4	0.058	271	0.041	310	0.028	233	0.024	289	0.020	226	0.007	244
DCP12	.501	0.484	0.363	19	0.094	352	0.051	352	0.073	272	0.025	228	0.028	230	0.015	213	0.022	206	0.017	165
DCP13	.600	0.377	0.258	25	0.093	343	0.018	303	0.055	269	0.036	194	0.016	196	0.020	168	0.012	158	0.018	145
DCP14	.701	0.344	0.132	47	0.074	343	0.030	209	0.022	245	0.032	160	0.016	88	0.008	91	0.007	89	0.010	71
DCP15	.800	0.160	0.111	39	0.066	328	0.030	226	0.019	227	0.026	145	0.014	62	0.005	38	0.002	32	0.004	62
DCP16	.900	-0.089	0.083	25	0.057	310	0.026	245	0.021	229	0.023	140	0.011	65	0.007	51	0.003	8	0.005	30
DCP17	.969	-0.075	0.012	69	0.026	310	0.011	255	0.010	258	0.010	163	0.005	98	0.005	43	0.003	224	0.004	108

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.94	0.051	0.703	4.97	0.0	7.47	12077.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
229.0 (751.3)	129741. (2709.7)	0.10E 08	-0.071	1.147	8.83	-0.00199	3.634	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.467	4.970	0	0.160	33	0.056	276	0.059	167	0.022	49	0.007	103	0.007	208	0.039	80	0.017	279
CN		0.823	0.265	22	0.097	59	0.042	79	0.023	66	0.012	343	0.002	49	0.001	70	0.008	64	0.003	327
CM		-0.020	0.037	224	0.008	120	0.007	219	0.005	193	0.004	150	0.001	162	0.001	167	0.002	186	0.001	95
DCP 1	.010	2.088	1.158	356	0.251	58	0.062	34	0.028	65	0.005	295	0.012	62	0.006	313	0.004	29	0.004	168
DCP 2	.020	1.921	1.066	359	0.181	58	0.077	35	0.018	48	0.027	349	0.013	334	0.017	287	0.005	135	0.003	259
DCP 3	.030	1.894	0.977	359	0.144	49	0.079	14	0.009	296	0.017	327	0.006	47	0.013	324	0.005	34	0.007	332
DCP 4	.049	2.009	0.788	0	0.117	42	0.046	20	0.011	277	0.013	297	0.006	214	0.002	333	0.005	3	0.006	297
DCP 5	.074	2.007	0.628	1	0.146	56	0.057	22	0.016	284	0.013	298	0.016	258	0.010	190	0.007	67	0.005	272
DCP 6	.099	2.041	0.460	1	0.207	69	0.084	18	0.017	308	0.021	328	0.027	269	0.019	194	0.006	86	0.009	214
DCP 7	.149	1.893	0.246	14	0.270	63	0.045	18	0.053	49	0.053	316	0.025	241	0.014	212	0.008	143	0.001	229
DCP 8	.200	1.633	0.110	95	0.292	68	0.062	119	0.094	62	0.028	349	0.021	25	0.018	300	0.008	151	0.004	11
DCP 9	.250	1.390	0.143	93	0.245	60	0.245	131	0.081	186	0.004	357	0.020	6	0.005	67	0.046	121	0.021	78
DCP10	.300	1.071	0.310	37	0.291	79	0.204	133	0.111	147	0.047	153	0.051	155	0.031	218	0.013	79	0.015	27
DCP11	.399	0.812	0.365	23	0.139	70	0.028	100	0.079	72	0.030	108	0.018	114	0.006	115	0.011	130	0.010	284
DCP12	.501	0.628	0.334	27	0.069	57	0.052	38	0.066	55	0.020	40	0.026	56	0.015	111	0.024	90	0.010	53
DCP13	.600	0.499	0.278	33	0.031	0	0.060	36	0.039	33	0.033	3	0.022	34	0.017	48	0.028	28	0.006	16
DCP14	.701	0.427	0.186	43	0.049	294	0.041	37	0.023	322	0.029	333	0.014	298	0.010	330	0.016	352	0.013	301
DCP15	.800	0.247	0.185	31	0.052	302	0.036	30	0.028	316	0.028	309	0.012	268	0.009	298	0.009	290	0.007	222
DCP16	.900	-0.024	0.143	17	0.033	311	0.032	7	0.020	331	0.028	295	0.011	273	0.008	267	0.010	322	0.010	235
DCP17	.969	-0.060	0.032	22	0.011	314	0.006	18	0.010	31	0.015	312	0.003	268	0.003	302	0.006	7	0.005	253

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.051	0.704	4.90	0.0	9.84	12077.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.7 (750.4)	129703. (2708.9)	0.10E 08	-0.076	1.104	10.36	-0.00167	3.032	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.841	4.901	0	0.219	13	0.044	274	0.012	134	0.024	347	0.022	42	0.014	137	0.014	59	0.022	312
CN		0.935	0.187	35	0.041	103	0.019	150	0.004	149	0.007	172	0.001	39	0.002	208	0.003	0	0.005	29
CM		-0.031	0.049	207	0.007	14	0.003	281	0.002	335	0.003	309	0.001	14	0.001	59	0.002	73	0.001	102
DCP 1	.010	2.498	0.814	1	0.199	66	0.036	130	0.007	150	0.014	129	0.004	211	0.007	164	0.008	315	0.006	236
DCP 2	.020	2.331	0.824	2	0.184	72	0.024	48	0.019	84	0.011	157	0.007	233	0.012	165	0.002	354	0.001	347
DCP 3	.030	2.153	0.609	2	0.262	80	0.054	18	0.041	86	0.016	32	0.015	249	0.013	137	0.003	310	0.004	42
DCP 4	.049	2.260	0.563	3	0.163	72	0.060	11	0.015	349	0.009	252	0.004	115	0.007	198	0.007	123	0.007	59
DCP 5	.074	2.171	0.330	9	0.213	76	0.055	12	0.030	49	0.031	325	0.006	199	0.002	323	0.005	130	0.010	56
DCP 6	.099	2.168	0.179	18	0.214	77	0.019	81	0.057	68	0.023	330	0.017	78	0.010	336	0.011	89	0.013	11
DCP 7	.149	1.991	0.095	93	0.160	71	0.089	146	0.047	55	0.032	152	0.034	57	0.007	152	0.023	65	0.008	51
DCP 8	.200	1.730	0.221	126	0.078	77	0.131	155	0.018	141	0.047	153	0.003	275	0.034	160	0.007	111	0.019	119
DCP 9	.250	1.530	0.271	136	0.078	244	0.011	216	0.057	216	0.051	270	0.011	31	0.013	259	0.020	340	0.017	30
DCP10	.300	1.305	0.246	116	0.134	222	0.097	258	0.048	319	0.009	192	0.021	334	0.017	8	0.031	49	0.019	53
DCP11	.399	0.989	0.213	48	0.026	85	0.038	187	0.025	248	0.010	235	0.009	89	0.003	356	0.006	11	0.009	28
DCP12	.501	0.751	0.288	35	0.070	97	0.064	163	0.037	234	0.009	245	0.018	324	0.007	32	0.006	326	0.014	20
DCP13	.600	0.573	0.299	26	0.055	111	0.037	133	0.022	179	0.017	183	0.019	235	0.007	295	0.019	313	0.013	340
DCP14	.701	0.473	0.249	24	0.032	188	0.026	60	0.023	95	0.021	124	0.010	180	0.011	210	0.009	251	0.007	269
DCP15	.800	0.309	0.239	15	0.030	186	0.030	36	0.016	103	0.016	107	0.012	131	0.008	154	0.006	220	0.007	177
DCP16	.900	0.016	0.173	10	0.015	153	0.013	57	0.016	107	0.014	96	0.004	178	0.004	235	0.010	195	0.004	230
DCP17	.969	-0.058	0.042	20	0.004	118	0.006	45	0.008	89	0.002	249	0.005	149	0.004	304	0.010	212	0.006	250

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.05	0.051	0.705	4.90	0.0	12.49	12077.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.7 (750.5)	129636. (2707.5)	0.10E 08	-0.098	1.147	16.13	-0.00165	2.641	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.491	4.899	0	0.177	16	0.037	285	0.018	175	0.020	7	0.027	74	0.018	226	0.007	249	0.006	60
CN		0.599	0.157	37	0.027	80	0.014	125	0.008	199	0.002	113	0.001	201	0.001	38	0.003	267	0.002	76
CM		-0.049	0.049	201	0.004	236	0.002	159	0.001	350	0.002	143	0.000	308	0.001	153	0.000	328	0.001	204
DCP 1	.010	2.669	0.467	1	0.116	78	0.028	127	0.019	134	0.010	133	0.016	59	0.008	204	0.012	111	0.006	351
DCP 2	.020	2.607	0.496	2	0.152	80	0.034	131	0.021	178	0.011	101	0.006	41	0.006	144	0.014	148	0.007	41
DCP 3	.030	2.424	0.361	1	0.161	86	0.073	129	0.004	50	0.018	143	0.015	8	0.016	144	0.010	36	0.005	204
DCP 4	.049	2.381	0.220	9	0.254	80	0.034	51	0.026	73	0.012	346	0.013	65	0.009	3	0.002	342	0.008	287
DCP 5	.074	2.276	0.100	21	0.184	82	0.055	150	0.043	102	0.029	130	0.024	77	0.015	99	0.008	49	0.005	116
DCP 6	.099	2.240	0.071	117	0.140	79	0.075	154	0.018	151	0.051	144	0.006	87	0.023	144	0.003	162	0.014	142
DCP 7	.149	2.048	0.160	133	0.006	345	0.089	153	0.049	216	0.027	154	0.021	193	0.004	225	0.014	234	0.009	286
DCP 8	.200	1.753	0.270	141	0.113	237	0.050	137	0.064	234	0.012	279	0.017	235	0.020	322	0.008	251	0.007	248
DCP 9	.250	1.433	0.147	95	0.073	237	0.011	86	0.008	343	0.023	79	0.006	22	0.005	298	0.017	301	0.001	183
DCP10	.300	1.232	0.148	64	0.026	264	0.023	96	0.024	249	0.010	102	0.012	298	0.003	108	0.011	297	0.004	173
DCP11	.399	1.048	0.194	56	0.023	32	0.015	37	0.003	24	0.003	7	0.011	279	0.008	53	0.013	307	0.003	77
DCP12	.501	0.855	0.226	42	0.024	76	0.009	50	0.005	202	0.004	329	0.001	185	0.002	43	0.009	287	0.010	97
DCP13	.600	0.695	0.248	29	0.036	72	0.009	29	0.008	108	0.006	294	0.007	193	0.004	69	0.005	164	0.006	71
DCP14	.701	0.574	0.259	18	0.038	79	0.001	107	0.007	164	0.006	312	0.002	166	0.002	8	0.010	146	0.006	42
DCP15	.800	0.396	0.258	10	0.036	79	0.004	231	0.014	130	0.003	330	0.006	82	0.004	278	0.004	132	0.009	1
DCP16	.900	0.086	0.176	9	0.019	54	0.003	254	0.009	209	0.004	334	0.005	103	0.004	308	0.004	97	0.006	292
DCP17	.969	-0.047	0.039	27	0.009	22	0.004	3	0.008	259	0.005	331	0.004	42	0.002	266	0.003	340	0.002	56

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.02	0.168	0.204	[illegible]	0.0	2.43	12153.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
69.7 (228.8)	12506. (261.2)	0.33E 07	-0.059	[illegible]	10.41	-0.00133	0.757	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.430	7.889	0	0.655	356	0.121	319	0.032	355	0.061	324	0.018	357	0.017	265	0.040	232	0.019	277
CN		0.373	0.597	359	0.043	13	0.004	51	0.005	26	0.005	51	0.005	18	0.011	338	0.025	213	0.004	163
CM		-0.022	0.028	294	0.003	272	0.002	308	0.001	214	0.003	256	0.003	218	0.004	153	0.009	7	0.001	331
DCP 1	.010	0.931	4.176	347	0.303	6	0.064	125	0.030	70	0.033	306	0.009	202	0.005	135	0.054	268	0.011	91
DCP 2	.020	0.793	3.122	350	0.194	357	0.026	329	0.018	49	0.027	299	0.008	196	0.005	298	0.064	286	0.016	82
DCP 3	.030	1.018	2.658	350	0.157	354	0.031	325	0.018	30	0.015	296	0.012	225	0.005	248	0.038	285	0.010	107
DCP 4	.049	0.829	2.159	351	0.129	347	0.028	330	0.010	18	0.006	235	0.013	190	0.007	227	0.043	297	0.002	357
DCP 5	.074	0.820	1.749	351	0.102	354	0.017	338	0.005	307	0.010	295	0.005	245	0.001	158	0.031	288	0.001	234
DCP 6	.099	0.937	1.471	352	0.086	357	0.020	6	0.011	12	0.009	236	0.006	181	0.001	175	0.030	286	0.005	282
DCP 7	.149	0.664	1.094	354	0.071	2	0.001	292	0.005	249	0.008	17	0.008	289	0.003	241	0.036	280	0.009	147
DCP 8	.200	0.592	0.899	358	0.068	7	0.005	291	0.002	103	0.003	118	0.008	180	0.012	103	0.033	305	0.007	217
DCP 9	.250	0.485	0.773	359	0.060	4	0.017	359	0.010	55	0.007	310	0.004	269	0.023	10	0.026	176	0.009	114
DCP10	.300	0.480	0.655	359	0.058	14	0.019	25	0.008	326	0.005	318	0.012	340	0.012	348	0.029	178	0.008	203
DCP11	.399	0.411	0.534	7	0.049	24	0.009	73	0.011	21	0.009	56	0.005	26	0.014	353	0.045	207	0.006	233
DCP12	.501	0.285	0.407	11	0.035	33	0.003	85	0.003	155	0.013	28	0.013	11	0.011	320	0.032	200	0.007	138
DCP13	.600	0.315	0.312	16	0.029	39	0.006	253	0.002	72	0.012	67	0.011	1	0.017	310	0.024	204	0.004	53
DCP14	.701	0.293	0.213	24	0.033	42	0.015	135	0.008	354	0.015	89	0.008	33	0.021	339	0.036	190	0.005	252
DCP15	.800	0.155	0.132	35	0.012	41	0.014	102	0.010	12	0.009	130	0.008	11	0.016	355	0.028	191	0.003	216
DCP16	.900	-0.039	0.055	54	0.011	169	0.007	202	0.011	85	0.013	57	0.010	62	0.013	301	0.039	188	0.009	136
DCP17	.969	0.018	0.017	173	0.006	334	0.009	54	0.003	350	0.007	55	0.019	79	0.022	342	0.025	202	0.020	128

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.09	0.171	0.200	7.89	0.0	4.83	12153.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.5 (224.9)	12133. (253.4)	0.32E 07	-0.055	1.153	12.57	-0.00144	0.810	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.833	7.895	0	0.622	357	0.123	313	0.029	4	0.051	326	0.015	353	0.017	226	0.026	272	0.021	277
CN		0.585	0.596	0	0.047	33	0.014	335	0.003	300	0.004	327	0.004	283	0.002	188	0.011	11	0.006	284
CM		-0.015	0.031	294	0.007	285	0.002	115	0.001	125	0.001	154	0.002	66	0.001	22	0.005	201	0.002	104
DCP 1	.010	2.339	3.906	347	0.349	27	0.157	350	0.112	240	0.058	137	0.008	56	0.037	117	0.011	18	0.027	290
DCP 2	.020	1.911	3.167	350	0.211	2	0.031	10	0.015	34	0.011	328	0.002	200	0.014	104	0.030	235	0.012	261
DCP 3	.030	1.974	2.721	350	0.169	358	0.027	5	0.016	19	0.009	20	0.005	330	0.003	171	0.013	251	0.003	344
DCP 4	.049	1.618	2.206	350	0.138	354	0.025	337	0.002	310	0.002	47	0.004	282	0.005	6	0.014	218	0.003	314
DCP 5	.074	1.460	1.780	351	0.116	359	0.021	11	0.004	4	0.004	221	0.004	43	0.006	57	0.014	216	0.003	229
DCP 6	.099	1.475	1.491	353	0.098	4	0.025	41	0.003	43	0.009	340	0.005	16	0.008	147	0.020	229	0.003	247
DCP 7	.149	1.068	1.111	355	0.071	2	0.012	38	0.006	195	0.005	273	0.006	98	0.004	40	0.013	190	0.006	248
DCP 8	.200	0.915	0.917	359	0.059	14	0.019	6	0.004	225	0.011	357	0.008	0	0.005	342	0.020	213	0.006	29
DCP 9	.250	0.754	0.779	359	0.072	24	0.022	318	0.002	17	0.012	310	0.006	283	0.007	134	0.025	0	0.011	214
DCP10	.300	0.719	0.649	1	0.059	34	0.011	306	0.012	328	0.006	324	0.004	325	0.008	234	0.017	6	0.010	255
DCP11	.399	0.598	0.512	8	0.048	51	0.014	317	0.005	31	0.001	256	0.009	307	0.004	332	0.023	26	0.020	321
DCP12	.501	0.421	0.399	13	0.045	58	0.016	310	0.007	69	0.009	289	0.008	341	0.004	231	0.011	0	0.006	278
DCP13	.600	0.412	0.306	18	0.048	60	0.020	337	0.002	279	0.010	333	0.011	296	0.009	249	0.019	29	0.008	322
DCP14	.701	0.361	0.212	26	0.045	71	0.020	331	0.006	276	0.003	246	0.008	211	0.000	169	0.012	24	0.009	215
DCP15	.800	0.189	0.135	38	0.025	97	0.004	345	0.006	229	0.006	119	0.008	240	0.007	72	0.025	30	0.010	286
DCP16	.900	-0.039	0.056	51	0.015	114	0.015	228	0.011	302	0.014	6	0.007	293	0.018	200	0.014	339	0.008	272
DCP17	.969	-0.003	0.017	132	0.002	241	0.011	336	0.003	17	0.012	303	0.022	199	0.009	56	0.033	26	0.004	352

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.174	0.199	7.91	0.0	7.43	12153.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.8 (222.5)	11893. (248.4)	0.32E 07	-0.048	1.277	15.29	-0.00154	0.857	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.430	7.906 0	0.585 357	0.080 298	0.022 82	0.030 329	0.012 93	0.021 176	0.029 237	0.009 293
CN		0.807	0.589 7	0.050 17	0.009 354	0.006 6	0.001 153	0.005 232	0.001 230	0.008 292	0.004 293
CM		-0.008	0.033 292	0.004 257	0.000 37	0.001 161	0.002 313	0.001 38	0.000 65	0.002 90	0.001 128
DCP 1	.010	3.749	3.604 347	0.375 29	0.077 349	0.101 60	0.134 317	0.052 219	0.052 297	0.057 230	0.015 188
DCP 2	.020	3.115	3.140 351	0.215 359	0.056 5	0.007 280	0.009 31	0.020 207	0.005 37	0.025 330	0.007 316
DCP 3	.030	3.003	2.720 351	0.185 355	0.034 3	0.006 302	0.006 346	0.011 227	0.008 188	0.015 345	0.003 343
DCP 4	.049	2.469	2.193 353	0.174 357	0.028 323	0.014 5	0.014 263	0.006 239	0.011 265	0.019 350	0.007 274
DCP 5	.074	2.144	1.765 352	0.129 358	0.023 3	0.013 3	0.009 302	0.006 226	0.013 206	0.020 3	0.002 116
DCP 6	.099	2.037	1.471 354	0.118 1	0.018 351	0.015 30	0.007 286	0.016 173	0.002 265	0.018 342	0.005 265
DCP 7	.149	1.485	1.101 356	0.072 4	0.025 13	0 1 357	0.014 286	0.016 342	0.003 25	0.018 345	0.011 330
DCP 8	.200	1.250	0.913 359	0.056 9	0.016 14	0 0 292	0.006 43	0.011 231	0.016 121	0.021 356	0.003 256
DCP 9	.250	1.047	0.775 1	0.060 359	0.006 268	0 [illegible] 355	0.001 246	0.008 294	0.011 99	0.010 249	0.006 268
DCP10	.300	0.962	0.646 2	0.050 12	0.014 351	0 [illegible] 9	0.005 116	0.013 259	0.002 168	0.010 223	0.010 280
DCP11	.399	0.789	0.512 10	0.045 30	0.006 31	0 004 14	0.003 148	0.005 250	0.006 263	0.013 255	0.006 243
DCP12	.501	0.567	0.403 16	0.039 32	0.009 333	0.009 15	0.003 118	0.005 217	0.002 244	0.002 154	0.005 243
DCP13	.600	0.509	0.300 23	0.046 53	0.008 344	0.010 4	0.004 141	0.011 180	0.005 352	0.005 186	0.007 8
DCP14	.701	0.417	0.197 34	0.052 58	0.002 157	0.003 281	0.008 183	0.003 159	0.006 240	0.014 272	0.003 349
DCP15	.800	0.223	0.134 44	0.033 53	0.005 91	0.002 243	0.006 72	0.007 189	0.003 186	0.016 274	0.009 277
DCP16	.900	-0.027	0.080 47	0.029 271	0.009 154	0.003 297	0.010 139	0.014 321	0.002 42	0.011 331	0.008 22
DCP17	.969	-0.009	0.023 60	0.008 321	0.023 306	0.013 41	0.013 134	0.008 166	0.006 230	0.009 282	0.014 273

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.11	0.174	0.198	7.88	0.0	9.92	12153.5	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.6 (221.7)	11831. (247.1)	0.32E 07	-0.050	1.617	17.83	-0.00119	0.662	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.920	7.883 0	0.649 357	0.094 295	0.032 28	0.035 324	0.021 7	0.005 298	0.031 230	0.012 261
CN		0.916	0.631 16	0.069 309	0.035 93	0.006 274	0.008 79	0.007 18	0.001 64	0.017 238	0.007 248
CM		-0.010	0.024 257	0.021 356	0.014 220	0.006 30	0.003 234	0.001 252	0.001 237	0.005 52	0.003 56
DCP 1	.010	4.625	3.472 358	0.375 346	0.077 177	0.105 89	0.021 93	0.099 51	0.046 340	0.025 39	0.064 343
DCP 2	.020	3.855	3.076 1	0.313 329	0.030 104	0.020 327	0.011 290	0.017 328	0.001 316	0.025 290	0.012 357
DCP 3	.030	3.649	2.725 0	0.262 319	0.048 102	0.031 346	0.017 [illegible]	0.001 125	0.006 329	0.019 278	0.010 325
DCP 4	.049	2.620	1.760 17	0.678 0	0.261 252	0.116 141	0.049 62	0.043 356	0.034 279	0.031 224	0.000 240
DCP 5	.074	2.281	1.479 19	0.553 349	0.222 223	0.103 95	0.025 344	0.025 353	0.023 256	0.020 212	0.002 126
DCP 6	.099	2.165	1.319 19	0.433 339	0.179 197	0.094 63	0.021 294	0.011 2	0.018 218	0.006 259	0.009 260
DCP 7	.149	1.672	1.133 14	0.261 311	0.123 150	0.091 9	0.024 203	0.013 352	0.027 164	0.002 252	0.011 277
DCP 8	.200	1.443	1.010 14	0.190 292	0.111 125	0.057 343	0.024 221	0.016 309	0.015 112	0.038 304	0.012 217
DCP 9	.250	1.213	0.864 12	0.126 285	0.097 92	0.052 301	0.017 142	0.011 0	0.010 3	0.029 227	0.014 149
DCP10	.300	1.107	0.731 13	0.082 267	0.090 85	0.050 292	0.015 118	0.004 355	0.007 41	0.029 226	0.001 170
DCP11	.399	0.904	0.607 18	0.063 241	0.083 77	0.037 288	0.019 92	0.007 102	0.007 73	0.030 237	0.006 285
DCP12	.501	0.650	0.484 23	0.050 221	0.074 66	0.030 246	0.020 114	0.010 75	0.006 [illegible]	0.011 208	0.002 303
DCP13	.600	0.593	0.376 29	0.043 201	0.070 54	0.029 231	0.020 68	0.005 9	0.001 8	0.014 230	0.018 263
DCP14	.701	0.447	0.270 38	0.042 172	0.058 38	0.033 204	0.028 50	0.003 224	0.008 [illegible]	0.015 215	0.011 239
DCP15	.800	0.245	0.182 42	0.052 173	0.046 21	0.032 178	0.013 45	0.004 41	0.002 [illegible]	0.022 234	0.011 209
DCP16	.900	0.010	0.116 27	0.032 184	0.019 356	0.020 136	0.013 312	0.002 122	0.005 [illegible]	0.019 238	0.014 241
DCP17	.969	0.006	0.042 9	0.015 229	0.009 93	0.012 119	0.005 256	0.017 16	0.003 84	0.019 258	0.010 240

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.175	0.197	7.82	0.0	12.22	12153.6	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
67.4 (221.2)	11783. (246.1)	0.32E 07	-0.277	2.148	19.86	-0.00008	0.035	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.219	7.824	0	0.676	358	0.158	303	0.014	201	0.071	2	0.034	266	0.028	269	0.028	284	0.016	275
CN		1.070	0.710	28	0.224	300	0.133	166	0.084	62	0.053	314	0.033	224	0.018	109	0.031	351	0.011	244
CM		-0.038	0.062	188	0.066	41	0.045	291	0.028	188	0.021	86	0.012	352	0.009	248	0.010	169	0.004	59
DCP 1	.010	4.199	1.813	47	1.556	24	0.431	290	0.101	270	0.225	215	0.151	145	0.098	126	0.069	45	0.031	310
DCP 2	.020	3.630	1.927	41	1.278	14	0.425	282	0.101	205	0.078	179	0.051	88	0.025	88	0.062	337	0.022	265
DCP 3	.030	3.455	1.771	40	1.154	11	0.457	278	0.182	195	0.119	138	0.103	57	0.078	337	0.096	276	0.049	194
DCP 4	.049	2.952	1.582	37	0.881	11	0.360	272	0.164	157	0.076	40	0.045	256	0.042	133	0.050	345	0.023	254
DCP 5	.074	2.614	1.403	35	0.745	355	0.330	243	0.171	134	0.082	31	0.021	295	0.010	82	0.053	304	0.033	201
DCP 6	.099	2.490	1.324	34	0.695	342	0.324	226	0.172	119	0.080	44	0.029	344	0.025	313	0.052	285	0.037	184
DCP 7	.149	1.985	1.191	30	0.519	322	0.266	203	0.134	114	0.082	40	0.052	321	0.014	255	0.047	289	0.035	181
DCP 8	.200	1.642	1.079	29	0.454	316	0.232	202	0.153	123	0.111	43	0.071	303	0.026	269	0.027	295	0.031	155
DCP 9	.250	1.435	1.038	25	0.415	302	0.265	187	0.182	102	0.142	9	0.104	280	0.051	222	0.028	145	0.028	74
DCP10	.300	1.325	0.910	25	0.372	292	0.242	176	0.171	86	0.129	353	0.088	262	0.056	200	0.032	89	0.038	13
DCP11	.399	1.114	0.808	26	0.333	280	0.247	165	0.175	73	0.134	339	0.093	255	0.066	175	0.049	56	0.046	351
DCP12	.501	0.836	0.675	24	0.282	263	0.221	143	0.151	48	0.116	311	0.079	225	0.064	127	0.065	23	0.037	296
DCP13	.600	0.715	0.562	23	0.264	247	0.209	127	0.150	23	0.115	284	0.079	197	0.063	91	0.059	354	0.025	268
DCP14	.701	0.584	0.421	22	0.250	229	0.210	111	0.135	6	0.115	255	0.086	158	0.096	59	0.057	333	0.043	222
DCP15	.800	0.357	0.308	18	0.207	221	0.160	105	0.113	359	0.098	243	0.059	141	0.053	48	0.060	328	0.044	208
DCP16	.900	0.076	0.212	5	0.126	221	0.076	92	0.069	336	0.043	235	0.036	130	0.030	39	0.033	318	0.009	164
DCP17	.969	0.046	0.102	359	0.054	213	0.049	90	0.035	323	0.032	219	0.024	96	0.033	336	0.010	207	0.011	87

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.114	0.301	7.91	0.0	0.65	12159.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
102.5 (336.4)	27359. (571.4)	0.49E 07	-0.040	0.803	8.65	-0.00006	0.709	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.647	7.909	0	0.575	357	0.079	301	0.015	100	0.032	324	0.022	95	0.019	162	0.029	230	0.004	277
CN		0.141	0.670	357	0.042	3	0.010	326	0.005	301	0.005	322	0.004	272	0.003	226	0.000	43	0.004	204
CM		-0.017	0.049	299	0.004	319	0.001	224	0.001	71	0.001	153	0.001	163	0.000	249	0.001	21	0.001	18
DCP 1	.010	-0.616	4.680	349	0.391	9	0.122	315	0.118	11	0.043	90	0.038	190	0.017	214	0.009	16	0.009	222
DCP 2	.020	-0.247	3.409	352	0.259	351	0.070	323	0.026	299	0.018	276	0.021	250	0.021	221	0.019	30	0.003	331
DCP 3	.030	0.083	2.846	352	0.214	342	0.057	318	0.021	297	0.017	281	0.021	248	0.016	226	0.011	9	0.007	243
DCP 4	.049	0.215	2.319	352	0.183	342	0.040	299	0.012	311	0.018	301	0.014	245	0.011	236	0.014	345	0.004	216
DCP 5	.074	0.306	1.895	352	0.150	345	0.029	294	0.008	301	0.016	294	0.009	250	0.009	229	0.009	1	0.003	236
DCP 6	.099	0.419	1.607	353	0.125	350	0.025	294	0.001	319	0.015	302	0.009	264	0.012	235	0.012	20	0.005	240
DCP 7	.149	0.279	1.208	354	0.090	347	0.011	272	0.008	335	0.007	320	0.005	223	0.008	245	0.011	45	0.004	17
DCP 8	.200	0.251	0.996	357	0.074	351	0.007	266	0.003	321	0.008	342	0.013	273	0.013	221	0.016	33	0.004	123
DCP 9	.250	0.193	0.889	356	0.054	8	0.014	329	0.003	312	0.007	342	0.001	198	0.001	181	0.001	203	0.001	129
DCP10	.300	0.198	0.748	356	0.044	10	0.006	4	0.007	261	0.003	329	0.004	182	0.001	198	0.004	182	0.008	203
DCP11	.399	0.183	0.593	2	0.033	24	0.011	15	0.004	242	0.006	308	0.003	314	0.003	221	0.005	227	0.004	206
DCP12	.501	0.124	0.459	3	0.027	35	0.011	350	0.004	307	0.006	4	0.004	289	0.002	321	0.005	204	0.003	179
DCP13	.600	0.151	0.351	7	0.019	33	0.006	59	0.006	289	0.008	331	0.006	320	0.001	78	0.004	193	0.008	230
DCP14	.701	0.208	0.247	9	0.017	65	0.009	350	0.004	259	0.004	319	0.002	331	0.002	208	0.001	217	0.005	175
DCP15	.800	0.097	0.144	16	0.010	68	0.005	0	0.003	285	0.004	309	0.003	237	0.001	341	0.006	174	0.009	211
DCP16	.900	-0.075	0.040	38	0.010	173	0.004	250	0.007	264	0.004	317	0.005	339	0.004	174	0.004	257	0.003	251
DCP17	.969	-0.027	0.027	169	0.005	211	0.007	304	0.002	315	0.004	132	0.004	4	0.004	35	0.002	131	0.006	94

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.116	0.298	7.91	0.0	2.23	12155.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.3 (332.4)	26885. (561.5)	0.48E 07	-0.039	1.030	10.25	-0.00094	0.768	0.0

HARMONIC ANALYSIS

DAT TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.235	7.912	0	0.609	356	0.089	312	0.016	23	0.043	343	0.006	19	0.011	156	0.021	249	0.013	322
CN		0.354	0.691	356	0.047	8	0.011	8	0.002	357	0.003	317	0.002	295	0.002	262	0.002	251	0.001	306
CM		-0.015	0.022	304	0.003	282	0.001	222	0.001	212	0.001	117	0.000	123	0.001	75	0.000	107	0.000	305
DCP 1	.010	0.773	4.815	348	0.390	13	0.061	73	0.030	176	0.021	189	0.010	10	0.015	301	0.015	253	0.006	277
DCP 2	.020	0.764	3.610	351	0.231	353	0.046	348	0.012	344	0.010	295	0.003	267	0.008	276	0.008	281	0.007	274
DCP 3	.030	0.935	3.039	350	0.188	347	0.042	334	0.010	345	0.016	297	0.007	267	0.008	263	0.003	259	0.007	307
DCP 4	.049	0.932	2.481	351	0.152	343	0.030	328	0.008	292	0.009	341	0.006	226	0.007	315	0.008	248	0.009	296
DCP 5	.074	0.895	2.009	351	0.125	349	0.026	331	0.007	317	0.004	338	0.005	239	0.004	254	0.002	184	0.004	327
DCP 6	.099	0.917	1.692	352	0.110	357	0.020	339	0.006	334	0.003	308	0.004	359	0.004	260	0.006	220	0.006	305
DCP 7	.149	0.649	1.265	353	0.079	354	0.018	345	0.002	227	0.004	334	0.003	254	0.002	165	0.003	236	0.003	348
DCP 8	.200	0.542	1.039	356	0.066	6	0.014	10	0.005	100	0.004	29	0.005	271	0.005	227	0.004	204	0.004	285
DCP 9	.250	0.494	0.896	355	0.064	5	0.014	0	0.008	15	0.007	314	0.001	281	0.001	77	0.003	350	0.003	57
DCP10	.300	0.461	0.753	356	0.054	7	0.015	10	0.004	0	0.005	1	0.003	3	0.003	320	0.003	229	0.002	79
DCP11	.399	0.391	0.600	1	0.045	19	0.011	10	0.005	319	0.003	332	0.001	245	0.005	83	0.002	161	0.002	192
DCP12	.501	0.281	0.459	4	0.034	24	0.008	28	0.003	268	0.005	346	0.005	304	0.003	259	0.002	250	0.002	285
DCP13	.600	0.268	0.351	7	0.031	34	0.012	45	0.003	357	0.005	283	0.008	296	0.004	196	0.001	224	0.003	138
DCP14	.701	0.283	0.235	10	0.024	52	0.010	16	0.003	60	0.000	322	0.001	332	0.002	354	0.003	286	0.003	342
DCP15	.800	0.140	0.140	17	0.017	62	0.010	30	0.007	45	0.001	182	0.002	39	0.006	286	0.005	350	0.002	159
DCP16	.900	-0.071	0.047	27	0.006	51	0.003	15	0.005	296	0.008	282	0.004	159	0.006	222	0.002	176	0.003	291
DCP17	.969	-0.034	0.021	181	0.010	263	0.002	320	0.006	125	0.003	43	0.004	296	0.006	278	0.004	252	0.005	97

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.02	0.116	0.297	7.88	0.0	4.72	12155.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.7 (330.5)	26669. (557.0)	0.48E 07	-0.035	1.260	12.74	-0.00103	0.840	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.722	7.878	0	0.614	356	0.098	304	0.017	2	0.027	334	0.024	339	0.015	165	0.019	223	0.013	265
CN		0.591	0.675	357	0.059	11	0.009	323	0.001	100	0.003	340	0.004	322	0.000	191	0.006	163	0.001	348
CM		-0.010	0.025	305	0.003	254	0.000	115	0.001	350	0.000	171	0.001	198	0.000	207	0.000	341	0.000	82
DCP 1	.010	2.504	4.671	348	0.361	346	0.065	174	0.070	83	0.074	333	0.059	252	0.025	137	0.009	118	0.015	82
DCP 2	.020	1.981	3.527	351	0.266	7	0.076	342	0.032	294	0.010	189	0.006	310	0.005	156	0.011	25	0.008	357
DCP 3	.030	1.979	3.047	351	0.219	355	0.039	324	0.014	339	0.003	268	0.011	315	0.006	138	0.006	27	0.005	7
DCP 4	.049	1.790	2.482	351	0.180	355	0.043	331	0.010	313	0.003	179	0.006	317	0.003	236	0.006	357	0.009	19
DCP 5	.074	1.588	1.995	351	0.152	358	0.033	327	0.005	327	0.003	289	0.010	322	0.004	328	0.003	34	0.004	43
DCP 6	.099	1.494	1.673	352	0.135	4	0.022	337	0.004	246	0.004	36	0.009	316	0.003	188	0.005	332	0.005	70
DCP 7	.149	1.085	1.253	353	0.097	2	0.022	329	0.004	7	0.004	302	0.003	354	0.006	257	0.004	300	0.006	351
DCP 8	.200	0.900	1.029	357	0.080	9	0.017	299	0.002	72	0.005	265	0.008	325	0.001	254	0.003	23	0.005	304
DCP 9	.250	0.799	0.873	356	0.077	9	0.016	323	0.002	339	0.003	49	0.002	317	0.004	248	0.004	121	[illegible]	177
DCP10	.300	0.720	0.731	357	0.068	15	0.009	312	0.007	187	0.007	0	0.009	301	0.003	304	0.003	177	0.006	92
DCP11	.399	0.593	0.579	2	0.063	23	0.005	356	0.003	254	0.007	27	0.002	338	0.002	354	0.003	358	0.000	170
DCP12	.501	0.438	0.444	5	0.045	33	0.005	330	0.002	54	0.006	301	0.005	6	0.006	123	0.006	203	0.004	313
DCP13	.600	0.378	0.332	9	0.038	31	0.010	335	0.002	289	0.005	4	0.004	322	0.003	154	0.009	211	0.004	265
DCP14	.701	0.359	0.220	15	0.038	37	0.005	34	0.003	173	0.001	113	0.002	321	0.004	335	0.001	10	0.003	93
DCP15	.800	0.181	0.132	22	0.023	31	0.005	276	0.007	141	0.002	285	0.003	17	0.002	66	0.004	55	0.001	344
DCP16	.900	-0.054	0.050	28	0.006	6	0.003	337	0.003	286	0.003	293	0.005	33	0.001	274	0.004	67	0.002	275
DCP17	.969	-0.038	0.014	154	0.008	284	0.010	270	0.006	146	0.003	125	0.004	226	0.001	258	0.006	192	0.004	272

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.117	0.295	7.86	0.0	7.34	12155.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
100.3 (329.0)	26468. (552.8)	0.48E 07	-0.106	1.470	15.17	-0.00080	0.647	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.336	7.856	0	0.635	359	0.131	305	0.009	184	0.043	15	0.040	318	0.011	106	0.028	243	0.011	268
CN		0.752	0.605	10	0.138	349	0.046	192	0.032	52	0.022	313	0.016	220	0.021	100	0.014	334	0.005	286
CM		-0.014	0.021	245	0.022	62	0.023	308	0.016	193	0.009	96	0.006	353	0.007	253	0.007	115	0.002	357
DCP 1	.010	3.116	2.917	359	1.285	37	0.731	321	0.477	237	0.286	160	0.187	95	0.168	18	0.088	295	0.048	200
DCP 2	.020	2.505	2.319	2	1.041	39	0.599	322	0.415	236	0.287	148	0.177	71	0.131	3	0.065	298	0.041	258
DCP 3	.030	2.330	1.896	7	0.999	36	0.567	312	0.356	221	0.203	132	0.077	63	0.072	40	0.082	345	0.094	266
DCP 4	.049	2.358	2.047	0	0.464	12	0.157	289	0.074	190	0.056	87	0.037	340	0.026	278	0.027	162	0.022	81
DCP 5	.074	2.033	1.616	2	0.400	13	0.135	263	0.063	179	0.047	70	0.037	315	0.018	222	0.024	114	0.017	37
DCP 6	.099	1.852	1.335	4	0.355	12	0.126	273	0.070	162	0.052	51	0.041	297	0.024	204	0.029	107	0.018	9
DCP 7	.149	1.356	1.033	6	0.296	2	0.129	253	0.075	130	0.053	19	0.035	285	0.015	147	0.020	72	0.012	15
DCP 8	.200	1.159	0.951	9	0.257	347	0.141	215	0.098	100	0.071	357	0.049	256	0.032	165	0.024	70	0.015	0
DCP 9	.250	1.030	0.868	9	0.242	328	0.154	191	0.121	76	0.080	337	0.053	254	0.032	157	0.016	95	0.032	0
DCP10	.300	0.937	0.765	9	0.219	316	0.163	181	0.127	70	0.083	335	0.055	260	0.050	165	0.029	72	0.031	332
DCP11	.399	0.772	0.630	14	0.167	314	0.138	173	0.112	64	0.073	326	0.049	249	0.351	149	0.031	34	0.028	311
DCP12	.501	0.567	0.479	17	0.110	312	0.102	154	0.084	35	0.057	300	0.041	212	0.049	110	0.035	344	0.019	256
DCP13	.600	0.458	0.351	22	0.073	310	0.086	137	0.086	13	0.057	271	0.039	172	0.048	82	0.041	320	0.022	221
DCP14	.701	0.406	0.231	31	0.048	317	0.072	117	0.084	350	0.060	234	0.032	137	0.040	48	0.040	290	0.020	161
DCP15	.800	0.236	0.174	24	0.046	280	0.064	112	0.044	348	0.025	234	0.016	195	0.024	49	0.028	279	0.013	124
DCP16	.900	-0.014	0.091	42	0.041	227	0.037	104	0.033	328	0.011	249	0.016	118	0.022	22	0.028	261	0.011	137
DCP17	.969	-0.030	0.029	1	0.026	229	0.010	40	0.004	249	0.013	285	0.017	152	0.019	45	0.013	274	0.006	202

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.08	0.117	0.295	7.81	0.0	9.96	12159.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
100.1 (328.4)	26420. (551.8)	0.48E 07	-0.186	1.764	17.58	-0.00083	0.676	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.959	7.808	0	0.605	2	0.126	324	0.044	314	0.049	221	0.074	59	0.026	288	0.044	235	0.008	288
CN		0.878	0.501	26	0.228	8	0.082	274	0.055	189	0.041	104	0.027	28	0.022	320	0.020	290	0.014	180
CM		-0.024	0.047	211	0.044	89	0.027	1	0.018	303	0.015	230	0.009	147	0.006	112	0.007	59	0.005	308
DCP 1	.010	3.492	1.037	14	1.916	62	0.856	0	0.559	319	0.243	283	0.122	267	0.183	239	0.157	186	0.127	140
DCP 2	.020	2.936	1.061	18	1.467	62	0.680	358	0.400	305	0.161	266	0.075	251	0.125	234	0.118	181	0.116	144
DCP 3	.030	2.687	0.828	21	1.303	62	0.590	359	0.232	309	0.139	294	0.135	267	0.156	219	0.111	101	0.093	132
DCP 4	.049	2.731	1.253	13	0.798	46	0.353	345	0.200	285	0.157	223	0.116	147	0.073	80	0.058	18	0.048	307
DCP 5	.074	2.326	1.002	18	0.691	40	0.283	327	0.137	258	0.093	197	0.078	116	0.046	42	0.029	339	0.016	261
DCP 6	.099	2.099	0.873	24	0.653	33	0.292	310	0.140	227	0.087	171	0.074	100	0.047	23	0.031	318	0.021	225
DCP 7	.149	1.593	0.811	26	0.526	17	0.231	284	0.113	209	0.072	157	0.071	103	0.036	24	0.027	34	0.016	314
DCP 8	.200	1.342	0.738	29	0.445	14	0.221	287	0.151	219	0.134	156	0.107	81	0.063	10	0.031	314	0.030	262
DCP 9	.250	1.170	0.732	27	0.381	359	0.192	270	0.129	202	0.110	130	0.079	54	0.036	332	0.022	327	0.020	280
DCP10	.300	1.055	0.660	26	0.342	351	0.175	260	0.132	195	0.112	122	0.077	45	0.040	344	0.033	317	0.038	260
DCP11	.399	0.885	0.502	30	0.276	344	0.145	251	0.116	186	0.100	112	0.068	37	0.039	359	0.035	301	0.034	240
DCP12	.501	0.675	0.499	29	0.211	332	0.112	229	0.093	163	0.091	83	0.055	359	0.035	317	0.041	298	0.040	197
DCP13	.600	0.559	0.408	30	0.170	317	0.100	203	0.078	137	0.083	59	0.059	342	0.038	297	0.043	238	0.036	168
DCP14	.701	0.489	0.301	35	0.129	299	0.096	178	0.065	114	0.064	39	0.047	312	0.026	268	0.041	209	0.014	123
DCP15	.800	0.299	0.242	24	0.118	275	0.085	166	0.057	102	0.047	26	0.026	342	0.031	269	0.033	195	0.028	101
DCP16	.900	0.033	0.057	9	0.078	261	0.037	163	0.041	108	0.037	10	0.021	2	0.007	256	0.027	192	0.026	87
DCP17	.969	-0.016	0.043	18	0.044	264	0.011	199	0.018	137	0.013	0	0.007	1	0.013	304	0.017	195	0.008	97

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.07	0.117	0.295	7.79	0.0	12.35	12155.6	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
100.6 (328.1)	26401. (551.4)	0.48E 07	-0.236	2.005	18.50	-0.00121	0.982	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.352	7.788	0	0.581	1	0.055	340	0.059	31	0.118	335	0.110	216	0.034	4	0.025	53	0.015	322
CN		1.001	0.461	45	0.256	21	0.100	323	0.061	265	0.052	22[illegible]	0.048	153	0.030	73	0.027	74	0.017	344
CM		-0.039	0.073	206	0.045	107	0.023	71	0.021	18	0.015	347	0.017	276	0.010	211	0.006	215	0.006	117
DCP 1	.010	3.667	0.889	121	1.795	66	0.434	65	0.420	40	0.181	25	0.141	18	0.165	16	0.[illegible]	350	0.167	310
DCP 2	.020	3.122	0.727	102	1.451	66	0.361	49	0.315	30	0.139	352	0.066	352	0.095	14	0.113	354	0.142	32[illegible]
DCP 3	.030	2.859	0.573	110	1.235	71	0.331	57	0.329	49	0.241	7	0.114	335	0.114	352	0.105	319	0.092	292
DCP 4	.049	3.034	0.700	38	0.871	66	0.344	28	0.236	345	0.166	305	0.119	259	0.071	237	0.066	181	0.035	194
DCP 5	.074	2.563	0.639	47	0.744	55	0.284	10	0.152	322	0.099	285	0.075	234	0.032	203	0.045	157	0.018	116
DCP 6	.099	2.311	0.666	53	0.699	46	0.260	353	0.150	307	0.109	265	0.087	211	0.035	162	0.035	138	0.011	114
DCP 7	.149	1.788	0.710	50	0.536	28	0.175	342	0.158	305	0.125	249	0.102	201	0.056	150	0.041	119	0.026	57
DCP 8	.200	1.488	0.663	53	0.483	30	0.207	343	0.167	297	0.116	254	0.106	215	0.070	151	0.035	128	0 028	102
DCP 9	.250	1.323	0.683	48	0.433	18	0.208	326	0.154	278	0.105	238	0.102	192	0.055	127	0.055	109	0.017	80
DCP10	.300	1.201	0.646	46	0.385	11	0.192	319	0.145	270	0.109	240	0.114	187	0.066	123	0.059	102	0.039	63
DCP11	.399	1.028	0.600	44	0.305	6	0.166	314	0.119	262	0.102	243	0.119	178	0.065	112	0.068	109	0.045	54
DCP12	.501	0.809	0.535	39	0.233	349	0.131	297	0.099	237	0.082	219	0.105	150	0.071	82	0.064	73	0.[illegible]	7
DCP13	.600	0.665	0.466	38	0.196	332	0.103	275	0.097	217	0.078	184	0.095	120	0.070	53	0.053	52	0.052	334
DCP14	.701	0.581	0.382	37	0.169	311	0.092	251	0.096	197	0.080	158	0.096	89	0.075	16	0.036	359	0.048	294
DCP15	.800	0.376	0.307	26	0.132	291	0.076	241	0.077	182	0.062	143	0.081	64	0.050	2	0.029	343	0.039	255
DCP16	.900	0.077	0.193	15	0.072	285	0.040	248	0.031	166	0.027	151	0.041	57	0.020	343	0.020	7	0.020	257
DCP17	.969	-0.001	0.085	13	0.048	299	0.028	254	0.016	144	0.005	161	0.026	57	0.017	348	0.006	208	0.013	211

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.73	0.086	0.398	7.91	0.0	0.01	12157.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
134.6 (441.5)	47866. (999.7)	0.65E 07	-0.046	0.864	8.06	-0.00086	0.926	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.010	7.909	0	0.644	356	0.106	316	0.015	330	0.045	343	0.013	9	0.015	215	0.047	239	0.016	281
CN		0.163	0.684	357	0.033	293	0.030	302	0.010	327	0.008	318	0.008	359	0.007	79	0.014	209	0.005	169
CM		-0.014	0.019	301	0.006	292	0.003	1	0.002	82	0.000	290	0.001	40	0.001	112	0.003	67	0.001	116
DCP 1	.010	-0.453	4.625	350	0.399	271	0.543	310	0.510	28	0.311	96	0.175	172	0.063	206	0.053	220	0.034	282
DCP 2	.020	-0.[illegible]41	3.655	352	0.166	307	0.144	295	0.096	355	0.069	70	0.065	166	0.057	231	0.047	287	0.036	32
DCP 3	.030	-0.063	3.299	352	0.164	11	0.043	206	0.040	282	0.030	81	0.053	191	0.044	255	0.024	304	0.005	57
DCP 4	.049	[illegible].213	2.666	352	0.121	358	0.052	185	0.076	244	0.060	315	0.035	39	0.030	125	0.036	209	0.008	285
DCP 5	.074	[illegible].156	0.629	0	1.10[illegible]	294	0.586	327	0.074	59	0.246	293	0.345	10	0.283	78	0.164	129	0.154	142
DCP 6	.099	0.390	1.827	353	0.09	5	0.012	204	0.035	233	0.033	300	0.018	359	0.018	98	0.028	198	0.005	269
DCP 7	.149	0.271	1.349	353	0.061	1	0.014	221	0.016	246	0.010	289	0.013	358	0.008	58	0.014	179	0.008	216
DCP 8	.200	0.226	1.099	356	0.050	359	0.009	295	0.010	260	0.009	298	0.009	323	0.006	51	0.021	189	0.008	188
DCP 9	.250	0.203	0.957	355	0.053	2	0.014	299	0.011	240	0.013	267	0.013	282	0.011	341	0.007	206	0.006	133
DCP10	.300	0.208	0.789	356	0.037	351	0.024	296	0.013	332	0.004	9	0.003	265	0.005	259	0.009	227	0.003	220
DCP11	.399	0.186	0.623	1	0.021	358	0.021	288	0.012	331	0.004	18	0.001	310	0.001	110	0.015	243	0.003	208
DCP12	.501	0.139	0.477	3	0.011	12	0.016	294	0.008	295	0.003	356	0.005	290	0.001	238	0.017	236	0.006	281
DCP13	.600	0.152	0.355	6	0.005	34	0.014	286	0.008	303	0.005	298	0.004	290	0.002	131	0.014	239	0.004	173
DCP14	.701	0.219	0.246	8	0.006	121	0.011	279	0.008	313	0.002	310	0.002	265	0.004	358	0.012	226	0.004	211
DCP15	.800	0.101	0.135	18	0.013	198	0.014	261	0.007	306	0.005	7	0.002	342	0.003	10	0.012	234	0.001	203
DCP16	.900	-0.074	0.037	59	0.024	202	0.016	261	0.006	274	0.001	251	0.002	292	0.003	345	0.015	219	0.004	70
DCP17	.969	-0.039	0.035	169	0.007	173	0.006	223	0.002	289	0.003	345	0.004	124	0.00[illegible]	248	0.012	248	0.006	283

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.05	0.088	0.396	7.91	0.0	2.44	12157.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.6 (438.4)	47406. (990.1)	0.64E 07	-0.032	1.077	10.44	-0.00084	0.901	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.440	7.914	0	0.682	355	0.136	319	0.044	332	0.056	321	0.029	332	0.012	194	0.029	272	0.030	278
CN		0.381	0.698	355	0.056	349	0.029	324	0.005	234	0.013	303	0.015	4	0.011	100	0.006	153	0.002	269
CM		-0.006	0.019	305	0.009	256	0.002	61	0.000	102	0.002	275	0.002	8	0.002	72	0.002	176	0.001	148
DCP 1	.010	1.016	5.468	349	0.472	352	0.168	144	0.068	200	0.044	175	0.049	56	0.049	319	0.028	250	0.015	292
DCP 2	.020	0.923	3.851	351	0.304	342	0.055	267	0.076	73	0.091	3	0.089	266	0.068	186	0.040	92	0.033	343
DCP 3	.030	1.001	3.181	351	0.235	356	0.101	330	0.034	288	0.010	260	0.005	327	0.007	246	0.003	228	0.017	323
DCP 4	.049	1.070	2.631	351	0.192	353	0.083	330	0.034	269	0.009	243	0.004	346	0.005	243	0.005	221	0.003	298
DCP 5	.074	1.729	0.839	354	0.889	261	0.472	336	0.117	186	0.413	291	0.523	12	0.440	89	0.257	160	0.078	186
DCP 6	.099	0.971	1.802	352	0.143	2	0.048	326	0.010	275	0.006	291	0.008	350	0.004	240	0.004	166	0.005	308
DCP 7	.149	0.701	1.343	353	0.107	359	0.028	330	0.008	275	0.005	337	0.008	242	0.002	212	0.008	174	0.002	19
DCP 8	.200	0.572	1.101	355	0.089	7	0.024	330	0.006	273	0.005	339	0.006	296	0.006	268	0.004	203	0.004	263
DCP 9	.250	0.499	0.949	355	0.087	5	0.022	314	0.007	311	0.010	309	0.004	1	0.002	217	0.003	54	0.006	338
DCP10	.300	0.452	0.790	355	0.076	7	0.018	314	0.005	328	0.006	314	0.004	328	0.002	129	0.002	11	0.003	311
DCP11	.399	0.372	0.628	0	0.064	19	0.018	317	0.004	278	0.006	351	0.003	316	0.002	208	0.002	82	0.004	302
DCP12	.501	0.276	0.480	2	0.053	21	0.016	314	0.003	305	0.004	45	0.003	352	0.003	79	0.003	331	0.001	296
DCP13	.600	0.245	0.354	4	0.043	33	0.016	319	0.006	268	0.002	294	0.003	9	0.003	197	0.002	277	0.000	1
DCP14	.701	0.280	0.235	7	0.043	43	0.018	308	0.005	225	0.003	57	0.003	67	0.004	109	0.004	8	0.003	266
DCP15	.800	0.128	0.131	14	0.031	45	0.016	302	0.004	231	0.003	76	0.004	337	0.003	183	0.004	44	0.003	329
DCP16	.900	-0.078	0.045	25	0.010	40	0.008	276	0.005	191	0.005	327	0.005	132	0.000	1	0.004	47	0.001	274
DCP17	.969	-0.050	0.027	168	0.006	227	0.008	210	0.002	50	0.003	23	0.007	246	0.005	171	0.002	8	0.003	317

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.73	0.087	0.394	7.90	0.0	4.72	12157.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.1 (436.6)	47100. (983.7)	0.64E 07	-0.030	1.265	12.52	-0.00090	0.959	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.717	7.896	0	0.742	354	0.217	324	0.093	311	0.062	302	0.053	329	0.034	251	0.067	248	0.043	261
CN		0.568	0.600	1	0.142	13	0.062	290	0.028	170	0.011	338	0.015	359	0.011	92	0.012	212	0.004	267
CM		-0.005	0.020	291	0.006	158	0.011	2	0.010	252	0.006	167	0.006	33	0.002	50	0.002	85	0.001	256
DCP 1	.010	2.032	4.051	349	0.799	52	0.568	3	0.482	280	0.328	203	0.144	120	0.046	54	0.023	170	0.037	81
DCP 2	.020	1.676	3.098	354	0.681	39	0.384	335	0.233	265	0.173	199	0.117	126	0.088	66	0.036	2	0.032	141
DCP 3	.030	1.728	2.745	354	0.529	30	0.268	322	0.159	248	0.116	173	0.079	97	0.056	45	0.042	343	0.050	288
DCP 4	.049	1.622	2.184	354	0.469	36	0.272	327	0.146	244	0.092	167	0.055	78	0.027	5	0.011	318	0.019	317
DCP 5	.074	1.985	0.861	0	0.432	293	0.434	333	0.302	204	0.375	285	0.506	14	0.429	89	0.265	169	0.366	239
DCP 6	.099	1.368	1.518	357	0.351	26	0.181	303	0.107	207	0.075	115	0.053	22	0.026	297	0.012	211	0.010	283
DCP 7	.149	1.026	1.178	358	0.260	13	0.137	281	0.092	177	0.061	83	0.043	354	0.025	268	0.009	223	0.013	750
DCP 8	.200	0.837	0.975	1	0.220	14	0.114	279	0.076	171	0.051	78	0.035	351	0.017	265	0.010	213	0.014	241
DCP 9	.250	0.752	0.844	1	0.218	5	0.106	268	0.060	151	0.040	41	0.029	316	0.009	246	0.018	252	0.012	204
DCP10	.300	0.671	0.712	2	0.187	1	0.088	257	0.056	134	0.039	25	0.024	298	0.006	209	0.015	257	0.008	194
DCP11	.399	0.562	0.562	7	0.144	7	0.064	253	0.047	122	0.039	11	0.024	270	0.013	178	0.006	278	0.003	257
DCP12	.501	0.399	0.423	10	0.117	11	0.049	251	0.033	102	0.027	352	0.016	251	0.008	131	0.013	247	0.003	111
DCP13	.600	0.322	0.300	14	0.100	17	0.036	255	0.029	97	0.025	327	0.016	226	0.004	111	0.012	235	0.007	156
DCP14	.701	0.318	0.176	25	0.090	28	0.027	245	0.031	87	0.024	322	0.017	205	0.006	79	0.010	228	0.004	72
DCP15	.800	0.158	0.115	27	0.065	12	0.020	206	0.024	68	0.019	312	0.013	190	0.001	110	0.009	202	0.002	38
DCP16	.900	-0.050	0.076	17	0.030	291	0.026	165	0.018	54	0.008	336	0.006	153	0.002	91	0.006	264	0.005	327
DCP17	.969	-0.048	0.005	52	0.028	273	0.019	163	0.008	60	0.010	255	0.002	193	0.005	178	0.003	237	0.004	332

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.088	0.394	7.83	0.0	7.46	12157.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.8 (435.8)	47018. (982.0)	0.64E 07	-0.096	1.380	14.49	-0.00100	1.069	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.457	7.834	0	0.577	2	0.110	330	0.028	316	0.049	301	0.057	148	0.037	324	0.027	244	0.007	278
CN		0.706	0.468	13	0.201	28	0.065	303	0.021	270	0.016	216	0.018	70	0.011	16	0.005	200	0.006	233
CM		-0.011	0.028	237	0.023	116	0.019	15	0.008	306	0.008	300	0.005	221	0.004	150	0.002	104	0.002	23
DCP 1	.010	3.033	2.653	347	1.172	76	0.679	25	0.302	342	0.236	323	0.149	276	0.095	271	0.083	275	0.104	222
DCP 2	.020	2.462	2.100	356	0.934	60	0.381	16	0.225	345	0.167	300	0.080	256	0.086	270	0.066	226	0.072	185
DCP 3	.030	2.276	1.688	354	0.875	69	0.462	24	0.312	336	0.222	282	0.135	224	0.059	208	0.048	173	0.054	135
DCP 4	.049	2.141	1.413	0	0.815	55	0.381	351	0.169	291	0.069	234	0.022	178	0.034	277	0.023	181	0.025	127
DCP 5	.074	2.191	0.583	22	0.297	47	0.469	323	0.269	277	0.254	308	0.289	30	0.245	103	0.190	171	0.041	236
DCP 6	.099	1.674	0.918	6	0.618	47	0.261	333	0.095	268	0.039	240	0.031	200	0.015	210	0.026	111	0.019	61
DCP 7	.149	1.283	0.799	11	0.468	33	0.203	311	0.066	253	0.041	229	0.039	169	0.016	87	0.021	81	0.021	30
DCP 8	.200	1.076	0.721	13	0.363	31	0.135	309	0.047	262	0.045	230	0.039	158	0.012	53	0.015	101	0.020	41
DCP 9	.250	0.948	0.679	13	0.309	18	0.119	286	0.043	237	0.048	198	0.045	125	0.029	39	0.015	51	0.023	337
DCP10	.300	0.843	0.591	14	0.263	12	0.105	276	0.041	226	0.049	183	0.047	110	0.032	26	0.014	10	0.021	315
DCP11	.399	0.704	0.517	18	0.206	8	0.083	259	0.029	207	0.044	167	0.039	89	0.029	24	0.013	1	0.024	292
DCP12	.501	0.533	0.408	21	0.154	2	0.059	243	0.016	179	0.029	155	0.031	64	0.024	352	0.009	327	0.020	255
DCP13	.600	0.425	0.307	27	0.124	1	0.052	228	0.014	110	0.019	133	0.027	49	0.021	341	0.015	260	0.018	210
DCP14	.701	0.388	0.197	36	0.099	358	0.051	204	0.025	88	0.011	125	0.024	37	0.017	317	0.009	244	0.014	198
DCP15	.800	0.219	0.167	32	0.070	326	0.053	191	0.020	101	0.018	108	0.024	15	0.016	317	0.011	243	0.012	173
DCP16	.900	-0.015	0.117	19	0.057	289	0.031	196	0.015	151	0.021	97	0.018	1	0.008	297	0.011	231	0.015	163
DCP17	.969	-0.039	0.039	13	0.038	279	0.013	211	0.009	177	0.009	128	0.009	24	0.003	307	0.008	241	0.008	137

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.64	0.087	0.394	7.75	0.0	9.97	12157.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.6 (435.0)	46947. (980.5)	0.64E 07	-0.160	1.517	15.66	-0.00130	1.386	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.965	7.749	0	0.587	3	0.052	323	0.066	36	0.071	353	0.103	299	0.120	158	0.016	51	0.017	319
CN		0.842	0.375	31	0.199	31	0.049	6	0.042	304	0.017	261	0.011	256	0.028	132	0.011	71	0.004	19
CP		-0.024	0.052	216	0.034	120	0.012	67	0.016	55	0.010	352	0.011	340	0.006	278	0.008	210	0.003	197
DCP 1	.010	3.627	1.313	343	1.373	85	0.455	52	0.266	85	0.293	53	0.173	20	0.119	27	0.026	346	0.056	37
DCP 2	.020	2.882	0.957	357	1.019	82	0.421	72	0.263	52	0.211	38	0.183	355	0.058	337	0.040	316	0.043	335
DCP 3	.030	2.598	0.652	352	1.013	87	0.475	62	0.247	31	0.150	21	0.141	355	0.077	331	0.054	297	0.059	307
DCP 4	.049	2.399	0.577	19	0.932	67	0.281	31	0.129	14	0.084	6	0.089	326	0.038	258	0.034	207	0.006	3
DCP 5	.074	2.464	0.447	117	0.323	44	0.347	356	0.048	354	0.313	308	0.365	6	0.274	100	0.231	177	0.121	249
DCP 6	.099	1.889	0.529	37	0.636	51	0.117	21	0.113	13	0.068	325	0.060	309	0.038	233	0.024	218	0.016	251
DCP 7	.149	1.501	0.608	33	0.467	35	0.073	19	0.109	353	0.070	301	0.066	283	0.053	204	0.020	200	0.022	204
DCP 8	.200	1.266	482	33	0.353	33	0.067	19	0.096	341	0.050	291	0.055	280	0.049	201	0.022	209	0.022	177
DCP 9	.250	1.119	0.395	30	0.298	25	0.080	9	0.103	319	0.054	261	0.054	253	0.057	182	0.014	120	0.022	131
DCP10	.300	1.001	0.508	30	0.258	21	0.082	0	0.106	306	0.059	251	0.061	230	0.060	161	0.024	109	0.027	103
DCP11	.399	0.847	0.481	32	0.207	14	0.056	350	0.085	297	0.047	238	0.047	219	0.091	157	0.025	86	0.022	91
DCP12	.501	0.663	0.419	32	0.167	2	0.039	323	0.066	272	0.033	211	0.043	199	0.044	131	0.027	68	0.021	51
DCP13	.600	0.538	0.354	35	0.142	350	0.029	291	0.060	257	0.034	187	0.035	175	0.038	113	0.033	42	0.018	13
DCP14	.701	0.478	0.268	41	0.122	333	0.033	236	0.053	232	0.039	155	0.032	140	0.039	87	0.035	21	0.020	348
DCP15	.800	0.293	0.231	33	0.107	317	0.038	249	0.056	223	0.038	151	0.034	130	0.030	71	0.028	17	0.012	343
DCP16	.900	0.031	0.173	21	0.075	303	0.033	263	0.044	215	0.026	158	0.028	127	0.017	52	0.027	16	0.008	321
DCP17	.969	-0.030	0.060	14	0.035	305	0.016	282	0.020	237	0.009	206	0.012	147	0.008	85	0.020	39	0.005	307

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.39	0.172	0.397	8.46	0.0	-0.01	12159.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.5 (441.2)	48010. (1002.7)	0.65E 07	-0.073	0.790	8.63	-0.00087	0.955	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.008	8.462 0	0.733 356	0.200 307	0.050 209	0.020 182	0.059 82	0.016 131	0.016 230	0.009 148
CN		0.133	0.682 359	0.043 33	0.009 330	0.010 225	0.002 285	0.002 169	0.001 213	0.003 197	0.003 165
CM		-0.017	0.039 296	0.009 305	0.002 305	0.003 10	0.001 17	0.001 3	0.001 96	0.001 51	0.000 54
DCP 1	.010	-0.525	4.501 345	0.253 281	0.566 292	0.489 358	0.316 60	0.168 121	0.066 153	0.041 150	0.035 181
DCP 2	.020	-0.294	3.549 350	0.190 347	0.111 291	0.071 305	0.057 8	0.043 113	0.049 191	0.034 285	0.037 8
DCP 3	.030	-0.085	3.162 349	0.238 12	0.004 140	0.038 243	0.022 43	0.049 156	0.049 215	0.025 296	0.004 321
DCP 4	.049	0.197	2.545 350	0.175 3	0.013 144	0.067 213	0.054 276	0.037 346	0.025 72	0.017 137	0.011 184
DCP 5	.074	0.303	2.064 350	0.156 6	0.016 44	0.050 199	0.047 258	0.036 325	0.029 40	0.026 102	0.024 154
DCP 6	.099	0.379	1.741 351	0.137 9	0.015 9	0.034 197	0.028 269	0.018 322	0.012 55	0.020 150	0.014 199
DCP 7	.149	0.269	1.280 353	0.093 9	0.013 351	0.014 205	0.016 243	0.013 338	0.007 357	0.007 62	0.014 167
DCP 8	.200	0.216	1.034 358	0.079 20	0.024 358	0.016 185	0.008 211	0.013 257	0.014 308	0.008 357	0.014 69
DCP 9	.250	0.195	0.902 357	0.069 21	0.017 11	0.007 190	0.010 192	0.012 174	0.009 227	0.006 238	0.003 293
DCP10	.300	0.201	0.751 359	0.052 27	0.019 330	0.006 254	0.005 317	0.004 97	0.007 143	0.008 229	0.004 227
DCP11	.399	0.180	0.602 9	0.049 51	0.013 20	0.016 229	0.002 236	0.002 208	0.003 187	0.005 245	0.001 178
DCP12	.501	0.133	0.459 14	0.037 66	0.010 41	0.010 229	0.001 287	0.006 208	0.005 235	0.003 238	0.004 120
DCP13	.600	0.148	0.348 20	0.036 77	0.007 344	0.010 193	0.002 223	0.009 192	0.004 289	0.009 214	0.002 82
DCP14	.701	0.208	0.246 26	0.036 84	0.007 84	0.013 190	0.002 102	0.004 221	0.007 229	0.001 148	0.002 203
DCP15	.800	0.095	0.152 40	0.029 104	0.008 135	0.011 183	0.000 90	0.004 90	0.004 61	0.004 128	0.002 217
DCP16	.900	-0.083	0.077 79	0.034 147	0.012 193	0.015 205	0.006 222	0.001 183	0.005 289	0.002 199	0.002 257
DCP17	.969	-0.041	0.043 191	0.014 153	0.009 186	0.013 218	0.002 174	0.007 98	0.003 72	0.009 253	0.005 205

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.07	0.172	0.395	8.44	0.0	2.44	12159.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.5 (437.9)	47464. (991.3)	0.64E 07	-0.056	1.045	11.08	-0.00081	0.888	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.440	8.442 0	0.757 356	0.199 309	0.046 102	0.005 47	0.021 58	0.018 212	0.011 250	0.006 196
CN		0.370	0.683 358	0.062 20	0.014 345	0.016 135	0.003 214	0.001 196	0.001 276	0.003 185	0.001 148
CM		-0.009	0.037 297	0.007 271	0.001 253	0.004 313	0.000 64	0.001 2	0.001 220	0.001 0	0.001 347
DCP 1	.010	1.079	5.204 343	0.422 342	0.161 126	0.081 121	0.040 143	0.047 20	0.044 271	0.020 217	0.002 231
DCP 2	.020	0.901	3.590 349	0.281 359	0.082 325	0.040 113	0.028 357	0.045 253	0.053 168	0.042 56	0.040 328
DCP 3	.030	1.021	3.039 348	0.219 356	0.092 325	0.019 203	0.017 181	0.010 60	0.012 279	0.005 227	0.003 309
DCP 4	.049	1.088	2.513 349	0.181 352	0.072 323	0.023 181	0.013 174	0.004 83	0.005 238	0.009 210	0.004 210
DCP 5	.074	1.026	2.029 349	0.155 357	0.052 321	0.013 174	0.007 157	0.005 29	0.002 265	0.009 165	0.002 111
DCP 6	.099	0.987	1.701 351	0.140 4	0.045 324	0.014 134	0.004 257	0.006 321	0.002 177	0.008 183	0.005 179
DCP 7	.149	0.720	1.765 352	0.107 4	0.030 333	0.015 153	0.004 95	0.005 119	0.003 311	0.010 142	0.002 49
DCP 8	.200	0.577	1.026 358	0.093 16	0.027 336	0.013 143	0.005 257	0.003 182	0.002 85	0.007 293	0.004 205
DCP 9	.250	0.501	0.889 356	0.084 16	0.018 343	0.016 101	0.004 239	0.001 171	0.011 232	0.003 288	0.002 182
DCP10	.300	0.457	0.749 358	0.077 17	0.019 334	0.011 126	0.007 195	0.002 252	0.003 279	0.003 162	0.004 59
DCP11	.399	0.381	0.599 8	0.065 39	0.008 0	0.018 129	0.008 235	0.004 208	0.004 265	0.003 246	0.004 42
DCP12	.501	0.285	0.458 12	0.051 46	0.001 1	0.016 123	0.003 268	0.005 237	0.006 332	0.002 164	0.001 97
DCP13	.600	0.256	0.346 18	0.046 47	0.004 19	0.015 147	0.005 294	0.004 88	0.003 136	0.006 198	0.001 29
DCP14	.701	0.280	0.233 24	0.043 53	0.007 24	0.018 142	0.004 124	0.004 168	0.005 38	0.002 186	0.002 186
DCP15	.800	0.132	0.147 38	0.030 69	0.005 20	0.019 133	0.002 303	0.005 218	0.003 88	0.006 139	0.003 1
DCP16	.900	-0.085	0.056 54	0.010 77	0.003 156	0.022 132	0.003 191	0.001 359	0.004 49	0.004 277	0.004
DCP17	.969	-0.057	0.033 158	0.008 10	0.005 177	0.016 136	0.003 193	0.006 150	0.003 290	0.006 133	0.009

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.05	0.173	0.394	8.41	0.0	4.99	12159.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
132.6 (435.9)	47143. (984.6)	0.64E 07	-0.044	1.271	13.28	-0.00087	0.952	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.994	8.414	0	0.729	0	0.199	294	0.096	4	0.040	106	0.038	91	0.010	101	0.012	164	0.010	99
CN		0.559	0.629	8	0.118	347	0.009	198	0.026	10	0.016	212	0.002	340	0.010	26	0.006	278	0.011	157
CM		-0.003	0.039	285	0.004	96	0.014	304	0.018	157	0.003	59	0.002	267	0.001	315	0.001	113	0.001	7
DCP 1	.010	2.06E	3.740	348	0.911	35	0.681	328	0.525	229	0.270	140	0.028	6	0.096	132	0.119	42	0.(	302
DCP 2	.020	1.778	3.054	355	0.666	24	0.398	317	0.264	225	0.171	158	0.105	95	0.097	46	0.068	351	0.063	296
DCP 3	.030	1.814	2.720	354	0.502	13	0.286	307	0.199	213	0.154	137	0.118	59	0.095	356	0.078	288	0.070	217
DCP 4	.049	1.714	2.216	356	0.448	9	0.228	293	0.126	181	0.051	82	0.009	324	0.034	57	0.057	325	0.067	236
DCP 5	.074	1.742	1.361	356	0.597	314	0.411	345	0.418	111	0.241	188	0.234	285	0.1[illegible]	19	0.043	108	0.100	200
DCP 6	.099	1.442	1.565	359	0.323	356	0.127	251	0.092	131	0.044	18	0.008	274	0.035	7	0.061	268	0.067	178
DCP 7	.149	1.093	1.234	1	0.241	338	0.098	213	0.084	98	0.046	336	0.013	253	0.025	298	0.036	216	0.038	129
DCP 8	.200	0.891	1.025	6	0.183	338	0.075	197	0.070	79	0.030	321	0.002	323	0.023	304	0.038	216	0.035	119
DCP 9	.250	0.776	0.895	4	0.146	328	0.079	162	0.068	26	0.037	284	0.009	182	0.008	283	0.019	165	0.020	67
DCP10	.300	0.686	0.759	6	0.114	326	0.065	146	0.066	12	0.030	269	0.013	193	0.009	173	0.017	90	0.018	323
DCP11	.399	0.560	0.608	16	0.085	335	0.065	145	0.071	9	0.034	273	0.009	177	0.007	135	0.002	152	0.007	304
DCP12	.501	0.407	0.464	23	0.070	343	0.051	136	0.063	353	0.026	227	0.013	91	0.007	88	0.010	355	0.010	260
DCP13	.600	0.325	0.347	33	0.060	359	0.037	137	0.065	345	0.023	219	0.010	98	0.005	106	0.009	339	0.015	245
DCP14	.701	0.310	0.244	48	0.065	3	0.028	128	0.057	333	0.023	204	0.012	54	0.007	55	0.010	297	0.015	195
DCP15	.800	0.153	0.168	53	0.030	339	0.037	117	0.059	332	0.020	202	0.009	58	0.008	55	0.012	283	0.015	177
DCP16	.900	-0.067	0.077	48	0.023	263	0.032	75	0.044	307	0.010	103	0.003	324	0.008	5	0.006	231	0.007	120
DCP17	.969	-0.058	0.018	117	0.019	263	0.012	100	0.038	333	0.008	146	0.005	343	0.006	79	0.010	292	0.009	185

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.11	0.174	0.392	8.30	0.0	7.49	12159.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
132.3 (434.2)	46884. (979.2)	0.64E 07	-0.148	1.545	16.01	-0.00069	0.750	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.494	8.303	0	0.794	5	0.272	301	0.082	90	0.043	82	0.015	100	0.017	100	0.036	194	0.009	219
CN		0.718	0.625	21	0.181	342	0.033	217	0.020	157	0.021	346	0.014	293	0.010	194	0.016	180	0.014	47
CM		-0.018	0.047	231	0.038	69	0.030	326	0.011	246	0.011	172	0.007	62	0.005	43	0.005	285	0.006	188
DCP 1	.010	2.750	2.610	354	1.120	57	0.727	0	0.400	290	0.121	287	0.158	267	0.112	215	0.072	185	0.092	184
DCP 2	.020	2.227	2.060	4	1.005	51	0.521	353	0.288	300	0.149	280	0.137	242	0.104	201	0.114	172	0.084	130
DCP 3	.030	2.034	1.621	8	1.028	49	0.558	341	0.289	275	0.092	245	0.105	236	0.125	181	0.119	129	0.075	72
DCP 4	.049	2.089	1.667	9	0.732	30	0.313	314	0.087	257	0.061	299	0.090	211	0.058	117	0.006	284	0.042	178
DCP 5	.074	2.108	0.889	15	0.743	348	0.411	357	0.315	168	0.314	264	0.208	15	0.252	106	0.154	222	0.056	31
DCP 6	.099	1.708	1.243	15	0.541	14	0.210	288	0.052	233	0.040	252	0.071	167	0.050	75	0.013	228	0.031	86
DCP 7	.149	1.330	1.086	17	0.418	356	0.174	268	0.060	214	0.056	181	0.068	95	0.048	17	0.012	218	0.036	19
DCP 8	.200	1.109	0.977	22	0.374	354	0.165	260	0.068	207	0.064	157	0.069	93	0.042	23	0.011	313	0.027	344
DCP 9	.250	0.976	0.897	20	0.317	336	0.136	226	0.069	174	0.062	110	0.067	31	0.044	306	0.026	239	0.013	267
DCP10	.300	0.875	0.802	21	0.272	328	0.127	211	0.073	151	0.074	79	0.061	351	0.028	265	0.023	256	0.027	203
DCP11	.399	0.743	0.711	27	0.222	323	0.115	203	0.069	155	0.081	70	0.066	343	0.036	271	0.031	260	0.039	179
DCP12	.501	0.565	0.579	29	0.169	305	0.112	173	0.060	107	0.075	26	0.061	294	0.034	239	0.044	193	0.046	93
DCP13	.600	0.458	0.471	34	0.146	293	0.118	156	0.055	84	0.071	359	0.054	263	0.027	215	0.039	166	0.053	59
DCP14	.701	0.413	0.345	39	0.121	275	0.114	135	0.051	41	0.056	328	0.042	227	0.020	189	0.037	129	0.053	20
DCP15	.800	0.238	0.252	34	0.108	250	0.103	120	0.041	26	0.047	310	0.030	212	0.021	186	0.033	94	0.030	344
DCP16	.900	-0.012	0.145	24	0.089	243	0.059	124	0.018	24	0.045	294	0.027	187	0.018	150	0.026	48	0.029	300
DCP17	.969	-0.042	0.037	21	0.048	257	0.021	144	0.007	104	0.025	305	0.020	188	0.004	203	0.014	51	0.010	344

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.49	0.175	0.392	8.25	0.0	9.96	12159.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
132.0 (433.1)	46741. (976.2)	0.64E 07	-0.237	1.815	18.13	-0.00061	0.664	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.963	8.249	0	0.769	9	0.274	313	0.119	156	0.067	117	0.037	44	0.036	138	0.056	311	0.010	28
CN		0.896	0.626	30	0.177	352	0.047	303	0.032	230	0.020	118	0.020	50	0.005	350	0.017	311	0.011	234
CM		-0.038	0.083	209	0.062	83	0.030	6	0.025	306	0.015	229	0.003	131	0.005	146	0.005	125	0.009	19
DCP 1	.010	3.219	1.097	353	1.657	78	0.746	19	0.379	351	0.192	341	0.103	30	0.185	346	0.150	263	0.032	61
DCP 2	.020	2.674	1.004	15	1.300	75	0.600	24	0.389	348	0.117	336	0.128	4	0.161	317	0.155	271	0.052	225
DCP 3	.030	2.496	0.877	21	1.161	68	0.489	10	0.241	345	0.151	356	0.129	324	0.100	289	0.110	273	0.090	240
DCP 4	.049	2.490	1.169	25	0.810	44	0.199	345	0.185	2	0.088	319	0.034	336	0.055	286	0.047	256	0.031	253
DCP 5	.074	2.391	0.777	38	0.620	14	0.246	28	0.096	241	0.387	286	0.310	25	0.179	132	0.167	238	0.129	24
DCP 6	.099	2.019	1.031	31	0.555	28	0.149	344	0.196	332	0.091	247	0.017	320	0.078	239	0.039	182	0.020	189
DCP 7	.149	1.593	0.978	29	0.428	15	0.174	334	0.197	295	0.114	200	0.021	172	0.069	193	0.037	109	0.025	96
DCP 8	.200	1.335	0.894	35	0.394	19	0.221	335	0.216	284	0.140	201	0.049	165	0.055	175	0.034	129	0.048	109
DCP 9	.250	1.195	0.852	31	0.324	4	0.198	319	0.209	255	0.138	166	0.059	127	0.047	129	0.043	81	0.059	48
DCP10	.300	1.067	0.784	30	0.276	354	0.170	305	0.183	237	0.138	148	0.062	107	0.040	87	0.041	42	0.057	5
DCP11	.399	0.923	0.760	35	0.245	341	0.132	295	0.157	232	0.129	152	0.068	116	0.050	85	0.068	39	0.068	345
DCP12	.501	0.743	0.682	32	0.220	316	0.105	254	0.124	191	0.107	118	0.065	85	0.068	32	0.078	352	0.078	281
DCP13	.600	0.619	0.607	33	0.237	295	0.116	211	0.120	153	0.101	80	0.047	35	0.054	357	0.073	318	0.092	238
DCP14	.701	0.548	0.488	33	0.238	274	0.139	178	0.133	117	0.106	37	0.054	337	0.051	300	0.052	261	0.077	189
DCP15	.800	0.350	0.389	24	0.227	260	0.142	168	0.140	99	0.107	11	0.058	299	0.050	253	0.028	212	0.045	166
DCP16	.900	0.058	0.242	11	0.145	242	0.080	147	0.084	69	0.067	327	0.025	245	0.010	262	0.024	233	0.047	140
DCP17	.969	-0.015	0.098	6	0.079	253	0.036	154	0.039	65	0.029	330	0.014	223	0.003	300	0.018	264	0.022	161

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.47	0.069	0.496	7.90	0.0	-0.00	12161.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
166.5 (546.3)	74042. (1546.4)	0.80E 07	-0.057	0.925	7.85	-0.00080	1.174	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.0 3	7.901	0	0.697	355	0.134	318	0.043	322	0.056	333	0.019	309	0.023	286	0.045	295	0.032	275
CN		0.162	0.756	357	0.022	316	0.026	271	0.014	289	0.010	317	0.005	329	0.001	73	0.005	319	0.004	282
CM		-0.016	0.027	321	0.005	319	0.002	45	0.003	36	0.002	66	0.002	102	0.001	144	0.001	189	0.000	29
DCP 1	.010	-0.054	4.370	351	0.808	262	0.476	311	0.261	28	0.048	347	0.078	33	0.025	252	0.111	298	0.087	25
DCP 2	.020	-0.032	3.808	353	0.475	276	0.151	284	0.174	49	0.049	13	0.065	232	0.023	245	0.058	312	0.017	29
DCP 3	.030	0.054	3.482	353	0.232	297	0.078	232	0.116	55	0.056	353	0.090	250	0.052	142	0.009	45	0.047	296
DCP 4	.049	0.245	[illegible]	1	353	0.114	346	0.093	300	0.067	330	0.087	123	0.037	173	0.027	293	0.012	223	0.030	263
DCP 5	.074	0.558	[illegible]	2	356	0.254	244	0.273	284	0.196	334	0.130	32	0.107	74	0.088	118	0.081	185	0.058	243
DCP 6	.099	0.384	2.066	353	0.139	27	0.049	177	0.073	245	0.038	311	0.012	17	0.001	17	0.012	305	0.005	320
DCP 7	.149	0.274	1.487	354	0.093	26	0.038	170	0.059	240	0.036	299	0.021	5	0.007	63	0.010	339	0.004	211
DCP 8	.200	0.226	1.189	357	0.062	24	0.022	203	0.039	254	0.030	305	0.017	359	0.011	84	0.005	286	0.007	252
DCP 9	.250	0.201	1.030	355	0.064	23	0.011	213	0.032	235	0.026	286	0.013	328	0.007	344	0.007	349	0.002	133
DCP10	.300	0.210	0.846	356	0.044	16	0.012	262	0.020	241	0.018	284	0.009	326	0.003	32	0.002	333	0.005	282
DCP11	.399	0.191	0.653	1	0.023	354	0.022	293	0.008	275	0.005	290	0.007	268	0.008	275	0.011	349	0.005	335
DCP12	.501	0.156	0.490	3	0.009	358	0.018	286	0.010	272	0.009	276	0.008	310	0.003	327	0.006	347	0.003	269
DCP13	.600	0.164	0.357	6	0.005	246	0.017	282	0.008	278	0.006	302	0.007	286	0.003	327	0.006	4	0.002	301
DCP14	.701	0.232	0.242	9	0.008	145	0.016	272	0.007	250	0.007	280	0.005	294	0.002	85	0.005	342	0.004	281
DCP15	.800	0.110	0.123	21	0.016	191	0.018	273	0.006	245	0.005	252	0.005	281	0.002	343	0.005	333	0.003	275
DCP16	.900	-0.073	0.037	93	0.031	201	0.019	238	0.007	260	0.005	272	0.006	294	0.005	321	0.006	354	0.000	329
DCP17	.969	-0.046	0.044	163	0.014	169	0.011	188	0.007	242	0.006	271	0.001	201	0.002	94	0.001	64	0.003	171

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.03	0.068	0.493	7.91	0.0	2.46	12161.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
165.3 (542.4)	73305. (1531.0)	0.80E 07	-0.035	1.155	10.46	-0.00088	1.165	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.460	7.907	0	0.665	354	0.115	317	0.044	325	0.028	298	0.045	353	0.034	210	0.030	268	0.029	282
CN		0.377	0.743	357	0.084	3	0.047	289	0.006	176	0.012	13	0.010	308	0.002	174	0.002	13	0.003	239
CM		-0.005	0.028	326	0.007	267	0.002	86	0.001	267	0.003	166	0.002	42	0.001	336	0.002	185	0.001	161
DCP 1	.010	0.911	4.839	350	0.403	11	0.428	322	0.193	317	0.231	114	0.072	149	0.054	232	0.010	293	0.035	219
DCP 2	.020	1.049	4.169	353	0.380	335	0.145	304	0.133	281	0.097	168	0.071	82	0.048	275	0.024	312	0.044	4
DCP 3	.030	1.160	3.778	353	0.391	331	0.089	209	0.089	248	0.076	229	0.073	67	0.044	346	0.022	275	0.040	353
DCP 4	.049	1.199	3.054	353	0.365	354	0.104	291	0.193	232	0.116	199	0.127	59	0.120	359	0.084	244	0.044	146
DCP 5	.074	1.290	1.818	356	0.298	295	0.421	302	0.037	83	0.072	85	0.122	336	0.088	51	0.083	137	0.095	207
DCP 6	.099	0.971	1.872	353	0.246	15	0.097	295	0.065	188	0.036	31	0.074	330	0.026	266	0.024	183	0.015	173
DCP 7	.149	0.713	1.364	354	0.156	7	0.068	292	0.013	163	0.029	21	0.030	297	0.015	216	0.005	196	0.003	207
DCP 8	.200	0.597	1.168	357	0.130	351	0.055	253	0.035	101	0.045	11	0.036	286	0.024	205	0.006	94	0.005	31
DCP 9	.250	0.532	1.028	356	0.108	340	0.046	218	0.051	77	0.055	348	0.041	264	0.029	172	0.019	58	0.016	334
DCP10	.300	0.469	0.839	356	0.094	353	0.034	239	0.030	83	0.039	344	0.026	261	0.016	159	0.012	34	0.006	317
DCP11	.399	0.371	0.641	0	0.079	16	0.030	288	0.007	100	0.020	351	0.012	299	0.007	165	0.009	6	0.006	253
DCP12	.501	0.277	0.472	2	0.068	26	0.031	297	0.002	123	0.012	353	0.007	247	0.007	147	0.008	8	0.003	284
DCP13	.600	0.236	0.335	6	0.065	38	0.039	301	0.008	207	0.009	36	0.005	292	0.006	186	0.005	331	0.002	305
DCP14	.701	0.266	0.199	10	0.068	50	0.038	306	0.011	211	0.009	19	0.003	283	0.002	174	0.008	352	0.003	286
DCP15	.800	0.116	0.107	20	0.041	54	0.028	296	0.005	201	0.011	9	0.004	266	0.003	159	0.006	354	0.002	251
DCP16	.900	-0.082	0.036	46	0.010	261	0.015	241	0.007	25	0.009	336	0.004	204	0.006	25	0.005	3	0.003	107
DCP17	.969	-0.054	0.026	170	0.017	245	0.008	200	0.004	84	0.006	296	0.002	197	0.001	140	0.003	33	0.001	17

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.71	0.070	0.492	7.86	0.0	4.85	12161.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
164.9 (540.9)	73041. (1525.5)	0.80E 07	-0.064	1.250	11.97	-0.00091	1.193	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.850	7.856	0	0.538	1	0.105	334	0.067	285	0.042	237	0.067	139	0.073	26	0.067	210	0.015	289
CN		0.542	0.580	1	0.170	34	0.094	313	0.024	228	0.012	146	0.007	108	0.011	17	0.009	222	0.007	218
CM		-0.005	0.020	282	0.013	138	0.018	19	0.013	299	0.007	212	0.003	166	0.003	131	0.006	24	0.002	313
DCP 1	.010	1.820	3.686	347	1.097	63	0.640	358	0.323	280	0.157	234	0.092	178	0.021	50	0.018	9	0.024	309
DCP 2	.020	1.783	3.171	351	0.763	67	0.639	4	0.396	287	0.166	228	0.100	198	0.048	141	0.022	41	0.028	62
DCP 3	.030	1.851	2.868	351	0.530	64	0.497	9	0.352	296	0.175	232	0.101	199	0.072	144	0.031	60	0.027	86
DCP 4	.049	1.674	2.089	352	0.681	65	0.531	1	0.332	291	0.153	224	0.038	213	0.071	191	0.056	85	0.006	47
DCP 5	.074	1.818	0.891	3	0.120	342	0.784	328	0.267	359	0.114	166	0.083	171	0.079	88	0.098	142	0.069	340
DCP 6	.099	1.330	1.342	356	0.519	49	0.278	333	0.127	261	0.064	202	0.040	135	0.020	66	0.027	19	0.021	347
DCP 7	.149	1.014	1.080	359	0.358	35	0.197	313	0.100	230	0.052	162	0.035	106	0.026	32	0.038	349	0.019	286
DCP 8	.200	0.836	0.926	2	0.286	31	0.151	305	0.077	218	0.040	154	0.029	104	0.027	46	0.038	355	0.021	285
DCP 9	.250	0.750	0.839	2	0.253	19	0.140	284	0.090	193	0.059	122	0.046	68	0.046	10	0.030	295	0.031	252
DCP10	.300	0.664	0.701	2	0.211	17	0.109	277	0.063	182	0.036	109	0.030	74	0.039	8	0.026	283	0.022	225
DCP11	.399	0.531	0.550	7	0.170	24	0.081	280	0.050	173	0.028	87	0.013	48	0.023	8	0.022	290	0.010	212
DCP12	.501	0.401	0.413	10	0.136	23	0.063	269	0.038	151	0.023	49	0.007	341	0.012	356	0.020	224	0.012	181
DCP13	.600	0.325	0.298	15	0.114	25	0.051	264	0.035	139	0.021	30	0.007	327	0.011	343	0.025	210	0.013	150
DCP14	.701	0.323	0.174	24	0.094	30	0.040	256	0.031	119	0.019	16	0.009	299	0.007	303	0.021	201	0.009	125
DCP15	.800	0.159	0.128	26	0.052	5	0.036	221	0.031	101	0.016	9	0.006	316	0.009	309	0.022	189	0.007	106
DCP16	.900	-0.058	0.082	19	0.047	298	0.040	197	0.022	94	0.010	32	0.011	348	0.011	269	0.020	174	0.004	51
DCP17	.969	-0.054	0.009	57	0.034	279	0.022	202	0.009	122	0.007	69	0.008	3	0.007	284	0.018	185	0.005	107

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	22.64	0.070	0.491	7.82	0.0	7.45	12161.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
164.3 (539.2)	72778. (1520.0)	0.80E 07	-0.098	1.328	12.94	-0.00114	1.494	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.453	7.817 0	0.676 2	0.174 338	0.076 3	0.122 343	0.103 298	0.076 199	0.011 143	0.045 360
CN		0.695	0.413 11	0.214 42	0.064 348	0.048 347	0.022 283	0.007 268	0.007 198	0.011 118	0.007 335
CM		-0.014	0.034 233	0.028 127	0.014 28	0.007 50	0.010 359	0.004 283	0.003 308	0.004 267	0.002 155
DCP 1	.010	2.578	2.079 341	1.497 76	0.575 24	0.275 20	0.239 334	0.112 299	0.066 286	0.033 313	0.004 278
DCP 2	.020	2.366	1.883 345	1.271 82	0.621 22	0.174 17	0.275 354	0.150 293	0.082 310	0.048 285	0.041 280
DCP 3	.030	2.355	1.786 346	1.000 83	0.552 25	0.126 0	0.234 11	0.174 303	0.074 310	0.072 275	0.038 281
DCP 4	.049	2.021	1.080 351	1.028 72	0.368 19	0.176 32	0.197 359	0.106 310	0.078 336	0.067 288	0.026 278
DCP 5	.074	2.145	0.280 48	0.254 80	0.558 332	0.428 15	0.171 25	0.071 1	0.013 71	0.070 207	0.086 229
DCP 6	.099	1.617	0.751 3	0.660 58	0.177 7	0.116 11	0.094 317	0.049 265	0.024 265	0.023 239	0.019 167
DCP 7	.149	1.265	0.710 8	0.462 45	0.127 349	0.094 355	0.083 292	0.039 240	0.013 235	0.011 201	0.006 113
DCP 8	.200	1.054	0.648 12	0.371 44	0.104 356	0.088 346	0.079 283	0.044 231	0.027 205	0.017 141	0.022 82
DCP 9	.250	0.958	0.628 11	0.310 33	0.097 344	0.086 320	0.067 253	0.034 206	0.028 173	0.040 115	0.028 36
DCP10	.300	0.850	0.553 12	0.252 27	0.087 341	0.069 318	0.052 244	0.017 205	0.022 182	0.031 111	0.019 23
DCP11	.399	0.691	0.464 18	0.205 26	0.039 328	0.048 328	0.041 247	0.010 203	0.020 188	0.033 116	0.020 16
DCP12	.501	0.535	0.375 21	0.164 17	0.027 297	0.035 316	0.036 222	0.011 121	0.015 185	0.027 106	0.015 6
DCP13	.600	0.430	0.294 27	0.140 10	0.030 255	0.017 312	0.027 202	0.012 90	0.007 147	0.017 80	0.015 317
DCP14	.701	0.398	0.196 37	0.109 1	0.036 212	0.007 340	0.023 181	0.015 70	0.005 154	0.015 74	0.013 300
DCP15	.800	0.223	0.174 33	0.091 336	0.036 221	0.015 253	0.030 173	0.017 89	0.010 88	0.011 63	0.009 302
DCP16	.900	-0.019	0.128 20	0.066 308	0.019 241	0.023 228	0.020 141	0.004 80	0.012 93	0.006 65	0.005 274
DCP17	.969	-0.048	0.038 23	0.037 294	0.009 271	0.017 248	0.010 150	0.004 67	0.003 59	0.007 154	0.003 318

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.31	0.139	0.494	8.41	0.0	-0.01	12163.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
166.0 (544.6)	73846. (1542.3)	0.80E 07	-0.071	0.853	8.36	-0.00082	1.106	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.006	8.410 0	0.746 354	0.192 306	0.014 15	0.009 176	0.013 24	0.030 217	0.013 284	0.008 314
CN		0.151	0.725 358	0.034 28	0.008 247	0.014 306	0.009 266	0.005 298	0.002 245	0.003 159	0.004 197
CM		-0.016	0.038 300	0.010 297	0.003 317	0.003 227	0.003 0	0.001 355	0.002 85	0.001 30	0.000 118
DCP 1	.010	-0.278	4.218 346	0.632 251	0.455 286	0.269 346	0.105 298	0.096 322	0.041 62	0.056 218	0.049 308
DCP 2	.020	-0.081	3.603 350	0.349 278	0.174 280	0.144 16	0.063 325	0.076 228	0.047 135	0.010 225	0.041 260
DCP 3	.030	0.032	3.150 350	0.148 306	0.149 287	0.091 355	0.017 65	0.085 223	0.031 95	0.067 42	0.075 246
DCP 4	.049	0.236	2.866 350	0.136 357	0.066 252	0.089 305	0.044 60	0.021 105	0.018 228	0.028 155	0.038 167
DCP 5	.074	0.926	2.018 351	0.097 288	0.131 228	0.235 264	0.234 336	0.188 30	0.106 90	0.075 102	0.126 134
DCP 6	.099	0.372	1.985 350	0.187 23	0.041 130	0.061 229	0.041 215	0.019 301	0.006 177	0.011 223	0.013 270
DCP 7	.149	0.255	1.438 351	0.144 21	0.036 100	0.037 207	0.032 232	0.023 281	0.010 280	0.009 280	0.003 34
DCP 8	.200	0.214	1.139 357	0.099 26	0.017 82	0.023 235	0.028 245	0.020 282	0.011 295	0.002 308	0.007 7
DCP 9	.250	0.193	0.996 355	0.097 27	0.026 71	0.015 167	0.026 211	0.017 267	0.011 268	0.003 331	0.003 287
DCP10	.300	0.197	0.822 356	0.074 29	0.014 43	0.004 156	0.015 192	0.009 249	0.007 232	0.002 235	0.010 270
DCP11	.399	0.187	0.636 6	0.042 48	0.009 334	0.015 359	0.007 207	0.006 236	0.009 262	0.001 180	0.003 275
DCP12	.501	0.149	0.480 11	0.036 61	0.004 292	0.011 353	0.007 204	0.004 273	0.008 312	0.001 300	0.004 170
DCP13	.600	0.152	0.359 17	0.031 92	0.006 223	0.012 349	0.004 195	0.003 206	0.008 270	0.002 222	0.001 202
DCP14	.701	0.227	0.248 23	0.035 94	0.008 198	0.011 4	0.004 173	0.002 221	0.004 262	0.004 178	0.005 208
DCP15	.800	0.105	0.146 38	0.030 118	0.009 185	0.009 6	0.004 179	0.006 164	0.003 256	0.005 147	0.001 194
DCP16	.900	-0.074	0.073 88	0.031 155	0.014 177	0.012 11	0.004 166	0.003 170	0.007 247	0.006 180	0.003 218
DCP17	.969	-0.042	0.049 155	0.021 148	0.014 183	0.006 0	0.009 198	0.003 130	0.004 177	0.009 224	0.003 28

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.09	0.139	0.493	8.44	0.0	2.30	12163.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
165.3 (542.3)	73444. (1533.9)	0.80E 07	-0.049	1.081	10.86	-0.00083	1.115	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.300	8.445	0	0.738	353	0.201	313	0.071	2	0.017	222	0.026	50	0.011	271	0.035	221	0.013	227
CN		0.363	0.709	357	0.064	356	0.009	266	0.020	22	0.010	259	0.005	56	0.007	297	0.004	216	0.002	70
CM		-0.005	0.040	303	0.008	255	0.003	48	0.008	226	0.001	57	0.001	283	0.001	116	0.001	215	0.000	19
DCP 1	.010	0.724	4.587	343	0.303	338	0.212	300	0.097	287	0.104	13	0.013	105	0.033	20	0.026	261	0.022	92
DCP 2	.020	1.006	3.969	349	0.313	309	0.028	278	0.071	269	0.022	123	0.028	344	0.008	101	0.017	260	0.049	211
DCP 3	.030	1.103	3.563	348	0.284	307	0.069	136	0.041	228	0.024	163	0.036	330	0.030	251	0.005	247	0.039	210
DCP 4	.049	1.226	3.004	349	0.283	312	0.053	171	0.029	180	0.029	184	0.032	327	0.047	256	0.003	162	0.006	265
DCP 5	.074	1.225	1.945	349	0.337	315	0.018	170	0.089	185	0.124	298	0.060	346	0.033	105	0.047	209	0.069	3
DCP 6	.099	0.951	1.767	351	0.187	357	0.061	276	0.017	96	0.022	358	0.034	247	0.019	190	0.009	345	0.005	351
DCP 7	.149	0.674	1.263	352	0.115	7	0.043	304	0.030	294	0.002	249	0.003	340	0.011	255	0.009	180	0.007	68
DCP 8	.200	0.572	1.089	357	0.062	344	0.021	74	0.058	334	0.026	230	0.018	105	0.017	313	0.008	243	0.002	152
DCP 9	.250	0.498	0.974	354	0.053	358	0.031	60	0.069	349	0.050	216	0.044	99	0.038	338	0.033	232	0.021	121
DCP10	.300	0.444	0.796	356	0.070	8	0.010	23	0.035	354	0.020	220	0.019	72	0.012	312	0.015	190	0.009	48
DCP11	.399	0.363	0.622	6	0.072	23	0.009	328	0.034	42	0.009	256	0.008	101	0.011	311	0.009	197	0.007	78
DCP12	.501	0.271	0.468	11	0.058	29	0.013	263	0.026	41	0.007	296	0.002	67	0.006	278	0.005	105	0.004	317
DCP13	.600	0.231	0.347	17	0.054	30	0.016	254	0.029	55	0.007	285	0.001	81	0.005	292	0.001	16	0.004	105
DCP14	.701	0.269	0.222	27	0.056	38	0.017	258	0.025	56	0.007	296	0.002	84	0.005	314	0.003	41	0.004	199
DCP15	.800	0.119	0.134	43	0.037	44	0.016	240	0.026	52	0.006	290	0.003	115	0.005	309	0.006	348	0.003	210
DCP16	.900	-0.087	0.058	71	0.009	259	0.014	198	0.033	33	0.009	221	0.004	10	0.007	269	0.001	335	0.005	249
DCP17	.969	-0.055	0.039	169	0.008	240	0.010	177	0.015	38	0.006	165	0.004	326	0.005	188	0.004	51	0.000	33

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.10	0.139	0.491	8.34	0.0	4.93	12163.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
164.7 (540.4)	73142. (1527.6)	0.80E 07	-0.088	1.297	13.34	-0.00066	0.891	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.932	8.343	0	0.804	3	0.339	312	0.158	42	0.036	304	0.020	354	0.029	91	0.058	195	0.026	200
CN		0.521	0.629	10	0.180	353	0.052	236	0.017	64	0.021	329	0.011	287	0.013	162	0.004	67	0.003	36
CM		-0.010	0.033	261	0.021	80	0.026	327	0.021	202	0.006	124	0.004	61	0.004	351	0.002	224	0.001	145
DCP 1	.010	1.496	3.459	348	1.023	38	0.635	334	0.354	223	0.130	134	0.066	289	0.025	185	0.030	101	0.027	292
DCP 2	.020	1.503	2.889	355	0.803	35	0.553	337	0.348	249	0.153	166	0.037	323	0.085	178	0.077	80	0.052	309
DCP 3	.030	1.529	2.480	356	0.712	27	0.445	328	0.251	253	0.147	191	0.056	127	0.033	115	0.056	80	0.049	342
DCP 4	.049	1.493	1.939	359	0.744	30	0.452	319	0.188	235	0.056	223	0.080	204	0.087	121	0.052	56	0.031	332
DCP 5	.074	1.661	1.165	5	0.521	1	0.351	306	0.301	226	0.207	308	0.119	33	0.153	104	0.078	22	0.085	54
DCP 6	.099	1.281	1.383	3	0.520	17	0.256	293	0.128	185	0.034	81	0.004	258	0.038	61	0.045	326	0.040	250
DCP 7	.149	0.993	1.158	5	0.384	356	0.185	260	0.120	154	0.041	51	0.018	28	0.034	349	0.050	262	0.038	179
DCP 8	.200	0.826	1.014	11	0.324	353	0.153	250	0.105	150	0.038	55	0.021	27	0.033	346	0.048	254	0.032	179
DCP 9	.250	0.735	0.922	8	0.279	337	0.147	214	0.099	94	0.061	6	0.030	312	0.023	275	0.041	213	0.029	137
DCP10	.300	0.659	0.785	9	0.230	331	0.120	199	0.082	76	0.050	350	0.025	293	0.019	240	0.027	177	0.018	101
DCP11	.399	0.541	0.646	18	0.184	337	0.107	199	0.073	73	0.042	5	0.030	321	0.036	241	0.032	161	0.025	75
DCP12	.501	0.404	0.505	22	0.140	330	0.094	179	0.077	53	0.043	335	0.029	279	0.039	201	0.029	117	0.025	37
DCP13	.600	0.322	0.383	29	0.104	331	0.081	165	0.072	30	0.034	309	0.020	255	0.032	174	0.029	62	0.023	330
DCP14	.701	0.325	0.262	39	0.075	327	0.074	145	0.077	10	0.030	272	0.013	225	0.029	156	0.027	34	0.016	292
DCP15	.800	0.164	0.188	40	0.057	295	0.069	139	0.068	1	0.021	267	0.010	221	0.021	138	0.019	7	0.009	250
DCP16	.900	-0.058	0.101	29	0.061	257	0.050	133	0.054	350	0.015	280	0.016	208	0.019	93	0.015	319	0.001	226
DCP17	.969	-0.053	0.012	58	0.041	258	0.029	142	0.037	356	0.010	296	0.011	216	0.009	102	0.006	357	0.003	230

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.39	0.141	0.490	8.27	0.0	7.30	12163.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
164.0 (538.2)	72543. (1515.1)	0.80E 07	-0.174	1.576	15.49	-0.00075	1.003	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.297	8.274	0	0.752	11	0.325	324	0.241	172	0.061	132	0.054	56	0.022	184	0.012	341	0.004	145
CN		0.674	0.559	24	0.224	2	0.056	278	0.046	203	0.030	131	0.025	37	0.013	328	0.009	286	0.004	155
CM		-0.021	0.052	231	0.039	98	0.025	0	0.017	340	0.017	267	0.011	184	0.008	121	0.004	51	0.003	11
DCP 1	.010	2.208	2.161	351	1.277	54	0.638	342	0.109	249	0.094	354	0.104	261	0.065	188	0.041	176	0.019	102
DCP 2	.020	2.088	1.958	2	1.073	56	0.580	354	0.194	282	0.043	347	0.113	268	0.042	157	0.073	286	0.077	195
DCP 3	.030	1.981	1.636	2	0.897	55	0.444	2	0.211	317	0.098	278	0.088	260	0.071	202	0.034	215	0.062	171
DCP 4	.049	1.886	1.297	10	0.885	48	0.332	343	0.093	348	0.115	316	0.094	295	0.053	202	0.022	205	0.036	192
DCP 5	.074	2.021	0.644	28	0.598	14	0.393	348	0.052	236	0.241	299	0.043	353	0.076	165	0.054	309	0.148	78
DCP 6	.099	1.562	0.986	18	0.621	34	0.206	319	0.047	309	0.070	268	0.060	187	0.026	108	0.007	207	0.031	126
DCP 7	.149	1.225	0.929	20	0.461	13	0.157	291	0.044	279	0.078	222	0.066	137	0.035	55	0.013	31	0.026	35
DCP 8	.200	1.020	0.852	25	0.398	12	0.137	291	0.062	261	0.082	202	0.059	123	0.023	50	0.019	61	0.022	21
DCP 9	.250	0.932	0.812	23	0.367	356	0.130	272	0.093	228	0.110	178	0.080	102	0.037	54	0.042	38	0.036	345
DCP10	.300	0.830	0.719	24	0.310	349	0.106	258	0.085	212	0.094	155	0.064	74	0.027	16	0.026	15	0.023	324
DCP11	.399	0.698	0.641	31	0.249	348	0.081	251	0.086	215	0.094	155	0.072	75	0.040	15	0.030	351	0.024	289
DCP12	.501	0.543	0.544	33	0.206	336	0.076	229	0.083	197	0.086	128	0.066	45	0.040	344	0.026	300	0.020	246
DCP13	.600	0.437	0.450	37	0.174	326	0.076	206	0.071	182	0.076	107	0.061	19	0.034	323	0.030	286	0.027	213
DCP14	.701	0.414	0.339	43	0.145	310	0.084	177	0.058	156	0.071	76	0.058	347	0.036	290	0.030	231	0.022	163
DCP15	.800	0.241	0.271	37	0.135	289	0.086	173	0.061	146	0.067	63	0.054	338	0.035	274	0.027	208	0.017	136
DCP16	.900	-0.015	0.163	24	0.099	273	0.051	176	0.060	144	0.054	43	0.036	314	0.026	253	0.020	181	0.014	117
DCP17	.969	-0.048	0.046	26	0.054	281	0.022	200	0.038	161	0.029	57	0.016	337	0.019	285	0.014	199	0.006	151

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.20	0.057	0.592	7.95	0.0	-0.02	12165.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
197.0 (646.4)	103168. (2154.7)	0.94E 07	-0.060	1.005	8.01	-0.00101	1.591	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.023	7.951	0	0.738	353	0.167	322	0.074	318	0.063	323	0.026	315	0.061	301	0.026	4	0.035	255
CN		0.166	0.806	357	0.028	320	0.039	265	0.008	274	0.009	343	0.006	319	0.004	329	0.004	108	0.003	198
CM		-0.015	0.036	328	0.008	275	0.001	101	0.004	26	0.002	80	0.002	87	0.001	72	0.003	257	0.001	129
DCP 1	.010	-0.380	3.803	351	0.559	258	0.566	317	0.046	351	0.153	285	0.158	9	0.026	302	0.116	320	0.089	14
DCP 2	.020	-0.189	3.437	354	0.393	266	0.378	317	0.105	46	0.079	282	0.123	8	0.052	63	0.068	304	0.091	68
DCP 3	.030	-0.055	3.228	353	0.169	282	0.228	306	0.106	32	0.020	12	0.043	17	0.048	82	0.052	237	0.026	78
DCP 4	.049	0.253	2.981	353	0.073	329	0.160	307	0.068	16	0.054	101	0.040	221	0.027	114	0.046	231	0.001	113
DCP 5	.074	0.562	2.545	355	0.154	217	0.257	258	0.214	300	0.136	9	0.102	33	0.149	84	0.134	138	0.126	192
DCP 6	.099	0.588	2.560	353	0.126	302	0.049	243	0.066	283	0.099	122	0.036	165	0.017	212	0.007	98	0.032	263
DCP 7	.149	0.437	1.956	355	0.211	293	0.192	193	0.028	98	0.083	114	0.082	70	0.115	317	0.067	230	0.023	163
DCP 8	.200	0.228	1.300	357	0.081	3	0.086	216	0.023	118	0.057	7	0.021	247	0.014	260	0.024	267	0.017	144
DCP 9	.250	0.206	1.144	355	0.075	358	0.058	186	0.023	89	0.058	325	0.047	251	0.010	226	0.025	46	0.005	112
DCP10	.300	0.196	0.915	356	0.070	13	0.028	189	0.014	93	0.056	313	0.037	245	0.015	147	0.024	22	0.007	290
DCP11	.399	0.173	0.667	1	0.051	41	0.028	307	0.022	252	0.017	291	0.015	278	0.006	283	0.013	64	0.003	311
DCP12	.501	0.145	0.487	3	0.032	43	0.032	300	0.019	245	0.011	287	0.007	302	0.005	281	0.007	57	0.003	301
DCP13	.600	0.157	0.343	7	0.019	53	0.031	303	0.015	233	0.007	265	0.008	310	0.003	248	0.009	90	0.005	314
DCP14	.701	0.234	0.209	13	0.027	82	0.031	300	0.016	232	0.003	230	0.007	320	0.004	301	0.010	98	0.001	189
DCP15	.800	0.106	0.099	31	0.012	133	0.023	282	0.013	222	0.005	266	0.007	324	0.003	302	0.013	93	0.002	216
DCP16	.900	-0.081	0.049	118	0.027	205	0.015	237	0.015	198	0.005	253	0.004	300	0.005	230	0.010	84	0.003	274
DCP17	.969	-0.043	0.050	164	0.011	181	0.015	179	0.006	191	0.007	242	0.005	251	0.004	293	0.010	97	0.001	220

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.81	0.059	0.590	7.94	0.0	2.48	12165.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.1 (643.4)	102555. (2141.9)	0.94E 07	-0.045	1.153	9.92	-0.00101	1.575	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.451	7.941	0	0.609	358	0.099	330	0.025	302	0.031	299	0.036	130	0.036	6	0.026	167	0.005	220
CN		0.358	0.731	357	0.122	33	0.075	310	0.040	253	0.012	158	0.015	58	0.010	18	0.002	124	0.006	219
CM		-0.008	0.034	322	0.003	166	0.008	55	0.005	294	0.003	225	0.003	160	0.002	101	0.002	325	0.001	287
DCP 1	.010	0.391	4.062	349	0.439	39	0.503	321	0.258	3	0.157	78	0.059	160	0.039	102	0.038	161	0.047	202
DCP 2	.020	0.566	3.628	352	0.405	35	0.258	319	0.144	348	0.135	94	0.104	166	0.049	231	0.020	315	0.044	241
DCP 3	.030	0.707	3.209	351	0.428	37	0.127	333	0.081	288	0.033	151	0.056	154	0.022	265	0.052	336	0.028	283
DCP 4	.049	0.942	2.759	351	0.455	50	0.156	354	0.138	268	0.075	244	0.065	123	0.033	346	0.062	316	0.028	299
DCP 5	.074	1.160	2.178	353	0.276	76	0.253	322	0.310	281	0.141	296	0.132	58	0.142	69	0.069	147	0.077	205
DCP 6	.099	1.099	2.094	351	0.380	60	0.329	357	0.247	259	0.112	237	0.018	194	0.049	48	0.011	215	0.008	84
DCP 7	.149	0.824	1.578	355	0.247	24	0.214	337	0.222	253	0.102	184	0.018	246	0.070	125	0.049	55	0.013	111
DCP 8	.200	0.605	1.213	0	0.221	6	0.103	291	0.065	243	0.069	183	0.056	85	0.036	21	0.014	348	0.014	288
DCP 9	.250	0.528	1.029	358	0.177	6	0.100	283	0.060	224	0.064	147	0.063	62	0.037	352	0.012	324	0.021	281
DCP10	.300	0.462	0.835	359	0.162	7	0.093	271	0.042	195	0.041	126	0.048	54	0.037	348	0.017	291	0.021	239
DCP11	.399	0.363	0.627	3	0.119	25	0.069	283	0.025	178	0.024	80	0.024	22	0.018	323	0.009	227	0.012	221
DCP12	.501	0.270	0.455	5	0.097	32	0.053	292	0.013	188	0.015	63	0.013	5	0.010	299	0.007	189	0.005	183
DCP13	.600	0.228	0.310	10	0.083	42	0.050	295	0.008	199	0.013	40	0.009	350	0.007	277	0.010	156	0.005	136
DCP14	.701	0.260	0.160	18	0.086	55	0.042	306	0.006	249	0.007	18	0.006	291	0.003	241	0.008	116	0.004	89
DCP15	.800	0.118	0.098	30	0.034	41	0.032	277	0.002	134	0.009	34	0.009	345	0.005	273	0.010	131	0.004	110
DCP16	.900	-0.083	0.036	61	0.024	261	0.030	246	0.001	164	0.006	51	0.011	0	0.007	300	0.010	132	0.002	140
DCP17	.969	-0.054	0.034	159	0.019	267	0.017	222	0.004	149	0.002	316	0.003	46	0.003	14	0.006	121	0.004	126

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.36	0.058	0.589	7.85	0.0	4.97	12165.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
195.3 (640.9)	103192. (2155.2)	0.93E 07	-0.060	1.232	10.88	-0.00103	1.605	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.969	7.852	0	0.631	3	0.146	337	0.067	0	0.099	330	0.094	299	0.124	174	0.047	346	0.039	312
CN		0.536	0.561	0	0.112	47	0.088	349	0.049	319	0.024	269	0.015	241	0.015	172	0.006	54	0.001	350
CM		-0.008	0.023	269	0.018	127	0.013	22	0.003	0	0.005	348	0.004	289	0.003	254	0.004	180	0.001	121
DCP 1	.010	1.285	3.445	347	1.050	52	0.208	39	0.057	352	0.101	286	0.037	234	0.025	221	0.025	339	0.038	344
DCP 2	.020	1.509	2.863	351	0.631	54	0.233	9	0.133	354	0.069	305	0.067	235	0.030	190	0.012	182	0.009	59
DCP 3	.030	1.515	2.454	350	0.573	58	0.237	15	0.129	344	0.059	311	0.070	253	0.056	205	0.026	170	0.038	56
DCP 4	.049	1.486	1.789	347	0.779	74	0.379	15	0.171	333	0.051	298	0.076	293	0.076	210	0.025	152	0.032	87
DCP 5	.074	1.790	0.923	350	0.393	102	0.623	338	0.315	354	0.113	357	0.103	336	0.091	128	0.130	144	0.079	207
DCP 6	.099	1.450	1.316	348	0.787	74	0.413	359	0.114	358	0.154	324	0.077	280	0.058	239	0.004	337	0.011	235
DCP 7	.149	1.069	1.056	0	0.512	55	0.315	357	0.133	324	0.158	312	0.103	249	0.054	279	0.071	227	0.014	275
DCP 8	.200	0.851	0.920	4	0.335	44	0.174	3	0.145	311	0.082	255	0.059	234	0.046	186	0.017	168	0.020	114
DCP 9	.250	0.778	0.847	1	0.260	39	0.159	355	0.134	290	0.063	224	0.045	224	0.048	165	0.011	77	0.022	114
DCP10	.300	0.683	0.705	2	0.221	34	0.116	349	0.106	286	0.059	212	0.031	205	0.047	159	0.031	79	0.025	54
DCP11	.399	0.544	0.562	7	0.168	31	0.052	330	0.045	286	0.037	206	0.016	155	0.020	136	0.025	42	0.012	10
DCP12	.501	0.407	0.419	10	0.134	25	0.028	296	0.013	294	0.013	193	0.000	151	0.011	161	0.021	25	0.009	289
DCP13	.600	0.325	0.296	16	0.113	23	0.025	268	0.005	350	0.010	204	0.005	93	0.005	119	0.016	19	0.009	321
DCP14	.701	0.324	0.167	27	0.088	23	0.022	220	0.012	49	0.007	218	0.010	91	0.006	50	0.013	350	0.005	275
DCP15	.800	0.157	0.130	30	0.060	356	0.028	227	0.001	149	0.011	185	0.010	100	0.007	55	0.013	342	0.006	270
DCP16	.900	-0.063	0.094	20	0.050	299	0.024	221	0.004	243	0.008	186	0.009	153	0.012	97	0.012	345	0.004	283
DCP17	.969	-0.054	0.012	62	0.033	284	0.011	231	0.006	270	0.005	218	0.006	153	0.006	94	0.008	336	0.005	260

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.37	0.058	0.594	7.85	0.0	-0.03	12167.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
197.8 (648.9)	103689. (2165.6)	0.94E 07	-0.087	1.328	7.78	-0.00139	2.185	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.033	7.854	0	0.570	358	0.142	333	0.048	334	0.008	76	0.062	97	0.110	345	0.040	27	0.018	166
CN		0.172	1.062	358	0.073	9	0.114	268	0.028	249	0.025	29	0.005	32	0.011	336	0.009	348	0.007	105
CM		-0.027	0.034	304	0.006	172	0.018	0	0.014	332	0.001	211	0.005	96	0.004	94	0.002	255	0.002	276
OCP 1	.010	-0.959	3.954	352	0.429	272	0.621	302	0.138	316	0.249	308	0.052	12	0.074	292	0.064	304	0.025	270
OCP 2	.020	-0.744	3.570	353	0.287	277	0.581	300	0.185	342	0.232	333	0.083	29	0.027	298	0.043	316	0.031	267
OCP 3	.030	-0.559	3.349	353	0.138	297	0.516	300	0.182	5	0.179	326	0.098	353	0.063	338	0.076	353	0.016	37
OCP 4	.049	-0.236	3.307	352	0.218	39	0.395	302	0.169	3	0.154	328	0.124	6	0.058	58	0.023	351	0.021	15
OCP 5	.074	0.533	2.202	352	0.420	265	0.650	314	0.220	7	0.258	327	0.314	26	0.211	97	0.031	203	0.085	54
OCP 6	.099	0.279	2.988	352	0.289	56	0.324	296	0.212	0	0.100	28	0.034	31	0.070	56	0.031	125	0.041	24
OCP 7	.149	0.422	2.682	353	0.221	66	0.213	278	0.143	319	0.124	57	0.111	182	0.024	9	0.063	152	0.020	199
OCP 8	.200	0.479	2.317	357	0.137	98	0.227	263	0.232	277	0.154	91	0.166	195	0.085	287	0.017	343	0.044	130
OCP 9	.250	0.416	1.825	356	0.148	29	0.171	290	0.293	229	0.137	112	0.039	196	0.030	97	0.084	343	0.052	159
OCP10	.300	0.315	1.447	359	0.221	2	0.130	241	0.174	232	0.099	153	0.079	105	0.015	15	0.082	350	0.028	263
OCP11	.399	0.224	1.021	3	0.153	2	0.117	205	0.053	203	0.015	260	0.056	80	0.039	296	0.029	301	0.012	27
OCP12	.501	0.189	0.704	6	0.113	352	0.100	219	0.072	158	0.023	347	0.034	16	0.026	312	0.027	253	0.011	159
OCP13	.600	0.193	0.462	11	0.067	355	0.073	234	0.063	140	0.023	1	0.038	320	0.022	312	0.013	192	0.020	151
OCP14	.701	0.282	0.248	19	0.059	49	0.055	241	0.039	139	0.028	350	0.039	282	0.012	241	0.015	94	0.015	79
OCP15	.800	0.123	0.138	32	0.008	332	0.054	227	0.027	126	0.022	358	0.028	269	0.006	222	0.017	68	0.008	34
OCP16	.900	-0.113	0.050	87	0.056	241	0.053	210	0.026	106	0.016	346	0.026	268	0.007	284	0.016	75	0.008	60
OCP17	.969	-0.064	0.048	166	0.009	197	0.026	196	0.011	154	0.004	118	0.005	247	0.011	293	0.009	82	0.009	47

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.48	0.058	0.592	7.87	0.0	2.05	12167.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.6 (645.0)	102536. (2141.5)	0.94E 07	-0.088	1.484	9.13	-0.00168	2.631	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.449	7.868	0	0.629	4	0.135	332	0.080	19	0.106	320	0.029	278	0.081	197	0.021	50	0.043	330
CN		0.417	0.965	358	0.233	27	0.092	327	0.043	264	0.026	213	0.005	46	0.005	195	0.008	86	0.011	359
CM		-0.025	0.038	287	0.018	123	0.014	59	0.008	58	0.008	351	0.005	252	0.002	222	0.005	224	0.003	134
OCP 1	.010	-0.027	4.113	349	0.593	23	0.449	321	0.238	8	0.046	64	0.100	334	0.068	79	0.030	27	0.046	20
OCP 2	.020	0.042	3.800	351	0.606	28	0.284	321	0.216	18	0.089	94	0.043	9	0.089	80	0.036	94	0.021	6
OCP 3	.030	0.187	3.507	351	0.661	33	0.156	317	0.191	25	0.131	101	0.018	80	0.058	83	0.051	122	0.016	271
OCP 4	.049	0.537	3.201	350	0.743	41	0.063	329	0.157	30	0.139	93	0.047	140	0.008	105	0.042	127	0.052	223
OCP 5	.074	1.260	2.039	349	0.358	339	0.362	335	0.155	36	0.100	23	0.165	61	0.145	136	0.056	203	0.041	175
OCP 6	.099	0.947	2.800	349	0.792	44	0.084	68	0.010	91	0.069	95	0.081	135	0.099	231	0.074	301	0.017	172
OCP 7	.149	0.949	2.453	349	0.710	45	0.173	29	0.157	197	0.100	253	0.050	66	0.111	245	0.117	291	0.081	330
OCP 8	.200	0.838	1.843	353	0.634	56	0.340	0	0.246	222	0.238	270	0.093	304	0.072	0	0.055	107	0.055	324
OCP 9	.250	0.734	1.403	357	0.413	60	0.311	340	0.117	252	0.166	279	0.113	248	0.059	317	0.085	162	0.038	43
OCP10	.300	0.668	1.128	2	0.260	22	0.239	337	0.158	282	0.063	262	0.100	253	0.025	195	0.055	153	0.062	100
OCP11	.399	0.513	0.864	7	0.153	6	0.113	323	0.107	290	0.049	155	0.015	313	0.031	165	0.016	102	0.033	97
OCP12	.501	0.383	0.669	10	0.159	358	0.075	290	0.062	286	0.050	177	0.014	84	0.024	148	0.034	73	0.024	25
OCP13	.600	0.314	0.483	15	0.152	1	0.069	271	0.035	261	0.048	177	0.031	93	0.014	98	0.035	49	0.029	343
OCP14	.701	0.347	0.264	24	0.119	8	0.057	245	0.012	234	0.033	162	0.034	74	0.014	24	0.026	25	0.030	308
OCP15	.800	0.195	0.182	29	0.086	344	0.059	239	0.023	185	0.026	152	0.028	65	0.013	355	0.011	357	0.015	272
OCP16	.900	-0.115	0.093	30	0.069	301	0.046	234	0.030	205	0.025	152	0.025	60	0.008	11	0.011	1	0.016	259
OCP17	.969	-0.072	0.024	153	0.029	300	0.017	226	0.016	228	0.015	180	0.015	89	0.003	77	0.007	42	0.007	271

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.13	0.057	0.591	7.72	0.0	4.65	12167.3	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
196.0 (642.9)	101741. (2124.9)	0.938 07	-0.111	1.553	9.91	-0.00195	3.039	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.850	7.716	0	0.637	5	0.086	331	0.046	27	0.070	10	0.069	309	0.069	17	0.019	303	0.026	262
CN		0.674	0.761	3	0.267	38	0.079	359	0.064	348	0.043	283	0.010	266	0.006	80	0.005	328	0.003	246
CM		-0.028	0.045	244	0.026	128	0.006	104	0.011	101	0.005	49	0.004	11	0.002	59	0.001	300	0.001	358
DCP 1	.010	0.931	3.540	340	0.985	45	0.202	56	0.148	350	0.042	63	0.046	190	0.025	208	0.032	295	0.029	300
DCP 2	.020	0.986	3.188	351	0.882	45	0.224	77	0.103	330	0.048	251	0.049	240	0.039	186	0.029	327	0.030	348
DCP 3	.030	1.091	2.809	351	0.789	45	0.254	88	0.091	292	0.108	251	0.047	275	0.018	138	0.025	320	0.032	359
DCP 4	.049	1.413	2.376	351	0.756	45	0.194	94	0.078	255	0.117	254	0.081	324	0.080	61	0.046	92	0.013	200
DCP 5	.074	2.043	1.813	354	0.188	333	0.379	340	0.144	0	0.119	282	0.133	2	0.176	85	0.078	113	0.039	142
DCP 6	.099	1.702	1.672	352	0.664	52	0.143	6	0.124	347	0.001	27	0.062	191	0.055	115	0.017	357	0.015	325
DCP 7	.149	1.531	1.474	352	0.734	54	0.186	345	0.154	15	0.037	282	0.041	211	0.098	88	0.011	246	0.028	35
DCP 8	.200	1.233	1.161	355	0.790	60	0.217	340	0.234	39	0.111	306	0.041	332	0.039	68	0.044	295	0.041	70
DCP 9	.250	1.053	1.002	357	0.599	56	0.165	350	0.249	28	0.125	292	0.097	3	0.037	258	0.070	335	0.017	220
DCP10	.300	0.892	0.891	5	0.385	50	0.189	11	0.132	15	0.125	320	0.044	346	0.057	306	0.050	316	0.033	275
DCP11	.399	0.712	0.762	10	0.225	39	0.114	7	0.048	327	0.077	314	0.032	208	0.028	319	0.008	258	0.026	251
DCP12	.501	0.558	0.631	15	0.178	15	0.068	6	0.068	306	0.041	284	0.028	220	0.015	286	0.015	207	0.012	253
DCP13	.600	0.662	0.492	22	0.166	2	0.040	354	0.071	299	0.032	248	0.023	237	0.017	209	0.012	162	0.006	177
DCP14	.701	0.459	0.315	32	0.139	349	0.010	246	0.049	296	0.033	214	0.016	193	0.013	162	0.008	125	0.009	146
DCP15	.800	0.242	0.263	29	0.123	326	0.028	250	0.060	286	0.032	209	0.012	164	0.007	149	0.006	86	0.008	132
DCP16	.900	-0.070	0.165	25	0.094	310	0.037	287	0.043	270	0.026	207	0.017	184	0.011	133	0.014	77	0.007	70
DCP17	.969	-0.074	0.022	92	0.039	295	0.012	297	0.019	291	0.011	214	0.004	176	0.002	87	0.007	58	0.001	107

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.107	0.232	10.30	0.0	0.01	12171.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
69.9 (229.3)	12411. (259.2)	0.335 07	-0.077	0.904	10.48	-0.00141	0.805	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.007	10.299	0	0.981	356	0.150	327	0.029	22	0.315	264	0.036	164	0.024	187	0.028	136	0.004	87
CN		0.165	0.830	3	0.061	19	0.006	344	0.004	24	0.002	279	0.002	290	0.007	335	0.015	144	0.003	48
CM		-0.025	0.039	296	0.007	287	0.002	329	0.001	327	0.001	358	0.000	292	0.002	172	0.007	339	0.001	188
DCP 1	.010	-0.510	5.624	348	0.328	356	0.216	287	0.199	8	0.072	42	0.051	264	0.059	27	0.082	70	0.059	136
DCP 2	.020	-0.290	4.218	350	0.312	357	0.068	332	0.010	244	0.003	333	0.027	262	0.006	288	0.026	12	0.018	70
DCP 3	.030	0.121	3.534	350	0.257	346	0.068	334	0.008	322	0.009	310	0.016	255	0.018	220	0.011	15	0.009	130
DCP 4	.049	0.136	2.875	351	0.234	343	0.041	338	0.012	291	0.004	296	0.006	102	0.01	279	0.016	42	0.016	358
DCP 5	.074	0.247	2.343	351	0.178	351	0.032	343	0.008	315	0.011	284	0.007	330	0.006	318	0.011	8	0.003	43
DCP 6	.099	0.466	1.977	353	0.147	359	0.029	352	0.009	13	0.019	294	0.004	169	0.008	280	0.019	336	0.008	77
DCP 7	.149	0.289	1.498	355	0.123	4	0.015	11	0.007	345	0.005	332	0.006	273	0.010	249	0.019	43	0.005	54
DCP 8	.200	0.242	1.222	358	0.092	18	0.013	15	0.008	1	0.005	164	0.007	39	0.013	319	0.019	43	0.015	152
DCP 9	.250	0.226	1.044	359	0.099	15	0.007	349	0.009	35	0.005	253	0.008	124	0.011	350	0.020	161	0.008	13
DCP10	.300	0.228	0.879	0	0.075	23	0.007	350	0.004	175	0.006	251	0.005	334	0.015	331	0.022	142	0.002	185
DCP11	.399	0.219	0.698	7	0.064	35	0.007	36	0.003	107	0.005	340	0.003	338	0.009	359	0.023	157	0.004	35
DCP12	.501	0.148	0.542	12	0.049	43	0.006	62	0.001	56	0.005	265	0.010	260	0.006	334	0.023	166	0.010	328
DCP13	.600	0.145	0.412	16	0.045	50	0.006	95	0.007	5	0.002	108	0.011	196	0.013	339	0.019	172	0.006	79
DCP14	.701	0.220	0.288	23	0.046	62	0.002	243	0.008	55	0.008	141	0.005	155	0.006	301	0.023	151	0.004	277
DCP15	.800	0.120	0.179	37	0.026	89	0.003	146	0.002	317	0.002	197	0.003	37	0.006	0	0.024	156	0.003	3
DCP16	.900	-0.044	0.065	64	0.013	128	0.007	234	0.011	164	0.009	250	0.006	179	0.005	2	0.027	138	0.002	305
DCP17	.969	0.019	0.029	153	0.007	244	0.016	162	0.004	173	0.007	86	0.018	18	0.011	14	0.033	175	0.017	57

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FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.00	0.172	0.198	10.29	0.0	2.46	12171.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
68.2 (223.7)	11984. (250.3)	0.325 07	-0.074	1.188	12.82	-0.00146	0.813	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.460	10.288 0	0.958 355	0.156 328	0.031 12	0.010 249	0.000 152	0.016 160	0.022 150	0.006 188
CN		0.387	0.811 0	0.073 21	0.012 353	0.004 346	0.002 27	0.003 275	0.004 125	0.015 135	0.002 79
CM		-0.040	0.041 296	0.007 265	0.002 37	0.001 212	0.001 149	0.001 108	0.002 296	0.007 340	0.002 296
OCP 1	.010	0.851	5.767 347	0.675 24	0.166 30	0.128 235	0.098 101	0.067 76	0.034 287	0.061 23	0.044 306
OCP 2	.020	0.841	4.292 350	0.351 357	0.087 344	0.018 351	0.016 271	0.027 69	0.019 309	0.063 47	0.010 304
OCP 3	.030	1.101	3.637 350	0.286 351	0.065 338	0.012 329	0.007 291	0.003 183	0.011 313	0.036 42	0.016 288
OCP 4	.049	0.922	2.951 351	0.224 349	0.056 337	0.009 339	0.011 258	0.001 14	0.006 255	0.035 58	0.012 229
OCP 5	.074	0.912	2.389 351	0.191 346	0.048 340	0.007 315	0.008 351	0.006 233	0.012 280	0.029 44	0.009 291
OCP 6	.099	1.005	1.996 353	0.163 2	0.039 357	0.017 327	0.004 359	0.002 104	0.006 337	0.032 28	0.010 296
OCP 7	.149	0.704	1.516 355	0.132 5	0.031 21	0.006 240	0.003 148	0.005 114	0.002 3	0.028 53	0.015 298
OCP 8	.200	0.629	1.230 359	0.108 16	0.026 351	0.002 182	0.004 113	0.014 286	0.015 286	0.034 42	0.016 293
OCP 9	.250	0.512	1.054 359	0.082 17	0.017 50	0.003 6	0.014 346	0.005 147	0.009 155	0.015 168	0.004 83
OCP10	.300	0.490	0.886 1	0.064 26	0.011 43	0.013 22	0.007 236	0.006 292	0.008 142	0.016 130	0.010 59
OCP11	.399	0.419	0.735 8	0.044 42	0.013 352	0.010 58	0.001 76	0.010 235	0.000 149	0.026 165	0.006 38
OCP12	.501	0.288	0.547 12	0.059 37	0.006 4	0.005 343	0.004 21	0.005 246	0.006 103	0.014 153	0.015 97
OCP13	.600	0.300	0.412 18	0.051 41	0.002 133	0.011 318	0.005 320	0.005 291	0.004 158	0.030 180	0.017 127
OCP14	.701	0.290	0.288 25	0.051 52	0.005 336	0.007 45	0.002 254	0.003 237	0.013 99	0.018 171	0.008 176
OCP15	.800	0.193	0.172 35	0.036 63	0.005 165	0.003 132	0.004 31	0.010 295	0.000 85	0.023 136	0.000 91
OCP16	.900	-0.029	0.081 63	0.016 128	0.021 252	0.004 359	0.014 65	0.007 322	0.012 [illegible]	0.042 161	0.007 326
OCP17	.969	0.019	0.028 135	0.006 159	0.005 266	0.002 340	0.003 255	0.002 12	0.013 191	0.017 168	0.010 192

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.02	0.175	0.195	10.15	0.0	4.97	12171.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
66.9 (219.6)	11597. (242.2)	0.325 07	-0.062	1.396	14.39	-0.00159	0.872	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.968	10.332 0	0.972 356	0.159 329	0.036 15	0.030 240	0 159	0.011 160	0.013 159	0.003 80
CN		0.609	0.813 4	0.082 17	0.014 24	0.010 353	0.003 309	0. 246	0.001 225	0.006 98	0.003 100
CM		-0.013	0.044 293	0.004 279	0.002 260	0.003 151	0.001 350	0. 230	0.002 130	0.004 243	0.000 148
OCP 1	.010	2.400	5.267 346	0.627 26	0.137 7	0.022 107	0.103 327	0.114 241	0.063 142	0.051 224	0.071 129
OCP 2	.020	2.043	4.124 351	0.484 357	0.056 358	0.019 37	0.030 295	0.011 319	0.013 149	0.017 254	0.015 131
OCP 3	.030	2.123	3.721 351	0.306 344	0.056 350	0.019 31	0.0 5 15	0.005 345	0.010 180	0.007 232	0.006 148
OCP 4	.049	1.755	3.001 352	0.283 355	0.040 313	0.023 55	0.015 330	0.020 204	0.011 103	0.009 266	0.011 153
OCP 5	.074	1.582	2.410 353	0.233 359	0.031 319	0.015 80	0.019 301	0.013 211	0.012 146	0.015 295	0.003 166
OCP 6	.099	1.569	2.015 354	0.195 1	0.019 340	0.015 54	0.012 270	0.018 197	0.006 148	0.021 243	0.009 155
OCP 7	.149	1.129	1.532 356	0.148 9	0.017 23	0.006 105	0.013 347	0.007 224	0.005 148	0.013 257	0.013 157
OCP 8	.200	0.976	1.250 9	0.112 11	0.006 313	0.011 107	0.003 6	0.007 246	0.008 170	0.017 234	0.015 203
OCP 9	.250	0.790	1.049 8	0.098 17	0.027 43	0.017 352	0.007 108	0.006 273	0.001 172	0.007 54	0.009 84
OCP10	.300	0.731	0.865 2	0.097 20	0.021 38	0.013 334	0.004 148	0.009 332	0.008 146	0.009 78	0.004 278
OCP11	.399	0.611	0.699 10	0.083 32	0.020 44	0.016 2	0.009 209	0.005 267	0.005 10	0.016 51	0.004 20
OCP12	.501	0.424	0.550 15	0.061 38	0.016 48	0.012 326	0.007 351	0.007 11	0.005 268	0.012 40	0.008 190
OCP13	.600	0.396	0.423 22	0.051 42	0.016 46	0.012 310	0.010 6	0.007 118	0.006 322	0.006 53	0.006 255
OCP14	.701	0.350	0.291 5	0.048 50	0.010 345	0.017 322	0 301 137	0.004 30	0.003 354	0.011 51	0.006 53
OCP15	.800	0.190	0.192 4	0.029 45	0.013 84	0.008 332	0.009 116	0.003 274	0.004 9	0.017 90	0.004 356
OCP16	.900	-0.022	0.094 55	0.007 4	0.008 71	0.014 353	0.005 153	0.007 44	0.014 257	0.016 65	0.009 141
OCP17	.969	0.008	0.028 82	0.034 272	0.005 201	0.013 3	0.005 .89	0.009 83	0.012 351	0.020 49	0.010 316

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.177	0.193	10.32	0.0	7.47	12171.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
66.3 (217.5)	11391. (237.9)	0.31E 07	-0.0[illegible]	1.629	17.41	-0.00134	0.727	0.0

HARMONIC ANALYSIS

DATA TYPE	A/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.467	10.323 0	0.990 355	0.149 323	0.046 27	0.032 224	0.034 131	0.013 140	0.009 236	0.006 16-
CN		0.751	0.894 12	0.100 326	0.050 93	0.023 328	0.006 93	0.006 349	0.012 232	0.021 351	0.003 233
CM		-0.016	0.035 266	0.022 4	0.022 219	0.010 39	0.005 279	0.001 173	0.004 61	0.004 136	0.002 12
OCP 1	.010	3.093	4.393 356	1.115 16	0.388 260	0.278 154	0.174 50	0.115 345	0.106 296	0.040 261	0.020 37
OCP 2	.020	2.671	3.923 1	0.769 2	0.222 274	0.126 155	0.064 57	0.064 324	0.064 239	0.059 56	0.029 35
OCP 3	.030	2.756	3.535 0	0.573 341	0.123 213	0.117 69	0.079 316	0.057 169	0.020 64	0.048 7	0.013 288
OCP 4	.040	2.059	2.594 7	0.726 358	0.239 258	0.098 192	0.052 3-	0.032 306	0.014 259	0.041 27	0.007 62
OCP 5	.074	1.857	2.144 8	0.605 351	0.209 230	0.125 130	0.068 [illegible]46	0.026 268	0.015 253	0.041 37	0.017 10
OCP 6	.099	1.806	1.855 9	0.490 345	0.178 208	0.129 77	0.063 327	0.025 252	0.019 166	0.055 42	0.016 354
OCP 7	.149	1.379	1.550 8	0.306 323	0.155 159	0.115 55	0.062 279	0.039 188	0.019 191	0.062 28	0.031 302
OCP 8	.200	1.224	1.377 8	0.221 300	0.145 130	0.115 15	0.090 258	0.034 182	0.021 188	0.069 33	0.030 314
OCP 9	.250	1.021	1.186 8	0.167 284	0.163 96	0.112 335	0.056 215	0.031 114	0.017 54	0.035 302	0.016 191
OCP10	.300	0.938	0.987 9	0.096 234	0.132 90	0.088 321	0.040 165	0.021 81	0.006 304	0.020 285	0.018 151
OCP11	.399	0.772	0.798 10	0.047 231	0.110 78	0.068 302	0.029 148	0.023 29	0.016 235	0.019 353	0.003 179
OCP12	.501	0.541	0.633 20	0.334 250	0.093 72	0.051 280	0.029 119	0.018 3	0.017 226	0.023 322	0.007 257
OCP13	.600	0.464	0.491 27	0.022 230	0.089 65	0.044 275	0.022 111	0.009 345	0.021 209	0.022 305	0.014 193
OCP14	.701	0.361	0.346 36	0.021 185	0.077 60	0.034 279	0.026 77	0.011 292	0.019 249	0.017 297	0.005 18
OCP15	.800	0.222	0.237 42	0.032 147	0.067 51	0.032 247	0.018 46	0.009 279	0.016 249	0.020 334	0.017 202
OCP16	.900	0.015	0.136 55	0.038 145	0.048 25	0.029 199	0.013 76	0.008 55	0.008 282	0.021 2	0 015 201
OCP17	.969	0.016	0.038 69	0.036 291	0.023 37	0.011 265	0.019 27	0.005 242	0.021 235	0.017 0	0.005 296

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.03	0.177	0.193	10.25	0.0	9.95	12171.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
66.0 (216.7)	11328. (236.6)	0.31E 07	-0.290	2.114	20.03	-0.00030	0.104	0.0

HARMONIC ANALYSIS

DATA TYPE	A/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		9.947	10.247 0	1.027 353	0.164 311	0.098 111	0.035 11	0.045 238	0.018 242	0.039 327	0.004 29
CN		0.910	0.953 20	0.227 315	0.123 163	0.067 52	0.055 330	0.026 143	0.021 84	0.044 319	0.013 253
CM		-0.037	0.036 197	0.070 49	0.052 285	0.033 174	0.021 69	0.014 312	0.009 212	0.012 151	0.003 28
OCP 1	.010	3.309	4.723 16	1.079 32	0.403 312	0.262 258	0.213 237	0.267 100	0.233 85	0.102 30	0.147 353
OCP 2	.020	2.864	4.238 19	1.053 21	0.550 253	0.154 188	0.026 242	0.063 169	0.049 47	0.056 290	0.018 353
OCP 3	.030	2.852	3.950 20	1.400 12	0.576 276	0.249 165	0.073 43	0.058 73	0.102 353	0.144 259	0.082 169
OCP 4	.044	2.370	3.067 21	1.181 17	0.484 265	0.226 177	0.060 37	0.040 155	0.073 96	0.094 341	0.061 250
OCP 5	.074	2.153	1.820 23	0.979 5	0.407 262	0.203 193	0.043 80	0.043 136	0.073 27	0.103 309	0.075 242
OCP 6	.099	2.057	1.661 24	0.823 354	0.350 247	0.179 138	0.057 60	0.057 54	0.067 351	0.095 267	0.066 226
OCP 7	.149	1.691	1.499 22	0.629 338	0.238 215	0.148 118	0.067 43	0.077 1	0.056 294	0.070 271	0.063 192
OCP 8	.200	1.454	1.413 22	0.536 323	0.231 202	0.148 113	0.129 45	0.096 340	0.062 266	0.070 261	0.080 164
OCP 9	.250	1.245	1.276 19	0.440 305	0.217 182	0.252 89	0.200 5	0.149 282	0.103 202	0.054 137	0.069 63
OCP10	.300	1.131	1.102 18	0.380 295	0.241 168	0.220 70	0.177 342	0.136 256	0.098 160	0.059 79	0.075 7
OCP11	.399	0.967	0.964 21	0.314 235	0.275 137	0.217 39	0.161 328	0.125 235	0.099 144	0.085 42	0.079 343
OCP12	.501	0.722	0.843 23	0.264 264	0.249 117	0.177 16	0.159 330	0.094 201	0.079 113	0.097 8	0.069 295
OCP13	.600	0.607	0.655 21	0.242 246	0.241 113	0.131 8	0.127 272	0.101 165	0.063 84	0.110 325	0.067 267
OCP14	.701	0.519	0.472 23	0.223 226	0.217 99	0.142 344	0.114 256	0.101 119	0.060 9	0.070 299	0.060 196
OCP15	.800	0.321	0.316 19	0.206 216	0.171 93	0.114 329	0.105 249	0.100 98	0.078 348	0.075 272	0.044 152
OCP16	.900	0.065	0.214 10	0.171 217	0.151 79	0.353 337	0.150 270	0.050 83	0.032 0	0.060 288	0.027 153
OCP17	.969	0.028	0.067 8	0.065 224	0.026 96	0.032 321	0.026 190	0.021 77	0.021 1	0.019 266	0.017 98

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.CM	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.64	0.113	0.302	10.35	0.0	0.02	12175.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
103.2 (338.7)	27368. (571.6)	0.468 07	-0.072	1.025	10.98	-0.00107	0.892	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.017	10.353	3	0.985	352	0.148	322	0.027	43	0.012	277	0.025	180	0.019	196	0.018	68	0.007	291
CN		0.150	0.837	359	0.067	31	0.116	125	0.023	181	0.015	223	0.011	299	0.006	53	0.004	240		
CM		-0.018	0.030	299	0.008	273	0.004	262	0.005	314	0.005	343	0.004	23	0.004	73	0.001	206	0.001	56
OCP 1	.010	0.041	5.110	354	0.612	229	0.835	278	0.536	341	0.295	36	0.142	77	0.043	103	0.037	20	0.105	70
OCP 2	.020	0.086	4.099	356	0.267	245	0.399	269	0.266	322	0.130	21	0.094	88	0.048	167	0.027	313	0.037	45
OCP 3	.030	0.204	3.697	354	0.100	320	0.168	248	0.123	291	0.084	355	0.025	46	0.018	199	0.022	24	0.029	104
OCP 4	.049	0.356	3.052	355	0.085	333	0.129	229	0.120	271	0.097	333	0.055	38	0.036	136	0.013	252	0.024	353
OCP 5	.074	0.327	2.604	353	0.183	19	0.087	181	0.098	224	0.088	295	0.054	6	0.044	107	0.031	180	0.037	277
OCP 6	.099	0.389	2.241	354	0.210	29	0.103	141	0.112	237	0.096	278	0.064	342	0.036	75	0.020	167	0.032	208
OCP 7	.149	0.247	1.760	354	0.223	29	0.114	118	0.110	182	0.082	250	0.051	310	0.022	40	0.011	129	0.023	242
OCP 8	.200	0.200	1.430	357	0.159	29	0.099	105	0.096	171	0.067	234	0.052	290	0.020	4	0.015	97	0.022	217
OCP 9	.250	0.179	1.234	355	0.192	26	0.096	88	0.092	150	0.066	208	0.046	262	0.023	326	0.017	72	0.015	210
OCP10	.300	0.161	1.027	356	0.147	23	0.083	74	0.070	135	0.056	195	0.041	250	0.023	296	0.013	41	0.014	139
OCP11	.399	0.190	0.788	3	0.081	30	0.035	69	0.035	126	0.031	189	0.029	223	0.028	264	0.012	357	0.008	59
OCP12	.501	0.150	0.565	7	0.048	43	0.009	67	0.010	136	0.017	194	0.017	210	0.019	242	0.005	313	0.005	285
OCP13	.600	0.170	0.442	12	0.037	63	0.010	133	0.013	169	0.013	181	0.011	201	0.010	237	0.006	96	0.004	196
OCP14	.701	0.221	0.316	15	0.045	72	0.007	74	0.012	152	0.011	174	0.011	210	0.012	245	0.003	4	0.002	271
OCP15	.800	0.106	0.184	26	0.032	93	0.010	133	0.005	139	0.008	166	0.009	164	0.007	229	0.005	2	0.003	300
OCP16	.900	-0.043	0.073	68	0.026	147	0.011	213	0.012	191	0.009	173	0.009	223	0.013	248	0.007	44	0.007	254
OCP17	.969	-0.026	0.035	149	0.004	128	0.013	130	0.015	271	0.015	198	0.010	181	0.005	258	0.007	59	0.008	211

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.CM	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.98	0.115	0.296	10.39	0.0	4.94	12175.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.5 (333.1)	26650. (556.6)	0.48F 07	-0.08e	1.427	15.27	-0.00084	0.687	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.941	10.393	0	0.988	356	0.161	326	0.014	11	0.016	172	0.012	257	0.022	154	0.009	93	0.006	69
CN		0.530	0.822	5	0.158	355	0.038	205	0.035	56	0.023	289	0.011	168	0.007	77	0.010	346	0.006	279
CM		-0.016	0.024	266	0.015	53	0.027	306	0.017	190	0.011	70	0.006	312	0.003	217	0.004	157	0.002	65
OCP 1	.010	1.769	4.926	354	1.320	23	0.465	[illegible]	0.354	204	0.146	119	0.032	352	0.041	103	0.059	24	0.063	295
OCP 2	.020	1.521	3.752	358	1.014	22	0.511	304	0.328	204	0.229	110	0.151	13	0.073	290	0.025	205	0.014	274
OCP 3	.030	1.410	2.896	359	1.016	31	0.606	311	0.368	214	0.223	120	0.107	30	0.036	5	0.064	322	0.095	260
OCP 4	.049	1.562	2.787	358	0.569	7	0.198	287	0.074	176	0.041	64	0.026	339	0.018	296	0.014	165	0.018	92
OCP 5	.074	1.386	2.228	358	0.475	8	0.160	283	0.064	165	0.035	48	0.027	308	0.017	216	0.016	141	0.015	48
OCP 6	.099	1.296	1.869	0	0.419	8	0.140	274	0.070	152	0.048	39	0.032	307	0.021	207	0.019	136	0.013	45
OCP 7	.149	0.973	1.440	2	0.338	3	0.122	259	0.066	134	0.055	21	0.036	286	0.023	183	0.010	129	0.010	3
OCP 8	.200	0.814	1.232	5	0.278	355	0.119	232	0.093	110	0.069	3	0.040	258	0.023	152	0.010	108	0.006	66
OCP 9	.250	0.731	1.113	4	0.224	342	0.100	195	0.094	73	0.066	313	0.037	204	0.017	72	0.015	299	0.004	127
OCP10	.300	0.690	0.947	4	0.190	325	0.126	175	0.124	54	0.085	311	0.047	210	0.024	126	0.014	28	0.012	344
OCP11	.399	0.578	0.816	9	0.139	323	0.108	162	0.105	50	0.073	298	0.035	190	0.021	101	0.018	25	0.016	315
OCP12	.501	0.414	0.624	11	0.103	3.4	0.094	154	0.092	36	0.063	286	0.040	165	0.023	63	0.020	341	0.008	303
OCP13	.600	0.342	0.453	17	0.073	342	0.359	141	0.071	18	0.054	249	0.036	133	0.025	23	0.019	319	0.011	269
OCP14	.701	0.326	0.291	23	0.349	3	0.345	128	0.054	358	0.048	233	0.036	111	0.016	16	0.017	312	0.012	242
OCP15	.800	0.174	0.232	26	0.319	307	0.051	119	0.051	349	0.036	222	0.020	97	0.003	307	0.013	355	0.013	246
OCP16	.900	-0.026	0.138	20	0.041	243	0.039	102	0.030	341	0.021	209	0.005	61	0.006	20	0.017	332	0.006	238
OCP17	.969	-0.029	0.018	1	0.030	243	0.018	103	0.013	325	0.004	176	0.008	78	[illegible]					

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.116	0.297	10.31	0.0	7.50	12175.4	20

V	Q	RN	CMEMIN	CMEMAX	ALPHA.MMAX	SENS	FOR	EXT DAMP
101.1 (331.8)	26492. (553.3)	0.48E 07	-0.213	1.847	17.67	-0.00079	0.647	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.496	10.308 0	0.943 357	0.148 324	0.079 313	0.089 182	0.080 90	0.046 188	0.033 157	0.013 72
CN		0.677	0.713 15	0.272 7	0.113 261	0.071 164	0.056 77	0.045 354	0.031 264	0.018 223	0.019 149
CM		-0.028	0.045 221	0.043 91	0.036 9	0.023 282	0.020 208	0.014 128	0.010 59	0.006 9	0.007 292
DCP 1	.010	2.160	2.682 358	2.085 53	0.975 349	0.404 289	0.233 259	0.189 227	0.189 176	0.144 129	0.146 74
DCP 2	.020	1.926	2.372 3	1.576 51	0.774 344	0.342 279	0.196 225	0.084 199	0.113 174	0.094 123	0.104 76
DCP 3	.030	1.848	2.250 3	1.363 53	0.703 348	0.330 284	0.143 231	0.067 222	0.130 179	0.112 123	0.104 72
DCP 4	.049	1.928	1.995 4	0.959 40	0.444 333	0.217 263	0.132 190	0.066 117	0.040 83	0.043 11	0.024 324
DCP 5	.074	1.715	1.651 6	0.790 33	0.357 317	0.167 235	0.100 157	0.054 75	0.026 42	0.033 335	0.021 270
DCP 6	.099	1.576	1.415 9	0.707 28	0.318 304	0.162 216	0.101 139	0.059 63	0.032 6	0.038 316	0.027 252
DCP 7	.149	1.233	1.200 13	0.580 14	0.287 281	0.162 189	0.096 121	0.075 52	0.042 354	0.044 308	0.035 242
DCP 8	.200	1.029	1.058 16	0.493 12	0.255 279	0.166 195	0.128 122	0.097 53	0.062 337	0.036 291	0.035 234
DCP 9	.250	0.920	0.987 16	0.427 359	0.238 260	0.162 176	0.130 103	0.108 56	0.070 308	0.050 264	0.038 209
DCP10	.300	0.840	0.868 16	0.361 354	0.233 251	0.145 168	0.118 97	0.103 20	0.058 296	0.033 252	0.032 205
DCP11	.399	0.719	0.768 20	0.302 349	0.169 243	0.147 167	0.120 92	0.104 15	0.067 295	0.043 251	0.048 203
DCP12	.501	0.548	0.630 22	0.228 339	0.154 224	0.114 141	0.100 65	0.080 350	0.061 273	0.037 235	0.050 170
DCP13	.600	0.462	0.510 24	0.186 326	0.145 205	0.109 118	0.095 39	0.084 321	0.063 243	0.033 203	0.049 146
DCP14	.701	0.427	0.378 27	0.141 310	0.132 186	0.098 94	0.089 21	0.078 300	0.061 226	0.035 174	0.043 103
DCP15	.800	0.255	0.290 23	0.129 284	0.116 171	0.034 86	0.074 11	0.062 287	0.038 213	0.034 165	0.042 78
DCP16	.900	0.015	0.162 17	0.087 275	0.065 166	0.045 88	0.052 4	0.038 260	0.021 211	0.018 133	0.028 59
DCP17	.969	-0.019	0.047 16	0.044 271	0.022 197	0.011 136	0.021 12	0.019 459	0.012 148	0.008 206	0.011 63

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.94	0.116	0.297	10.30	0.0	9.98	12175.5	20

V	Q	RN	CMEMIN	CMEMAX	ALPHA.MMAX	AERO DAMP	FOR	EXT DAMP
100.9 (330.9)	26392. (551.2)	0.48E 07	-0.280	2.076	19.40	-0.00091	0.741	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
PHA		9.978	10.305 0	0.965 359	0.180 341	0.061 2	0.111 260	0.141 154	0.048 319	0.025 277	0.013 78
		0.832	0.674 -25	0.307 8	0.085 287	0.054 244	0.052 176	0.050 115	0.041 32	0.022 325	0.019 302
		-0.043	0.078 208	0.060 98	0.031 22	0.021 352	0.023 268	0.017 227	0.016 169	0.010 96	0.006 72
DCP 1	.010	2.655	1.280 13	2.222 59	0.611 9	0.379 29	0.390 329	0.127 291	0.203 294	0.195 253	0.171 209
DCP 2	.020	2.337	1.358 19	1.771 57	0.543 1	0.215 8	0.239 317	0.068 255	0.119 303	0.143 240	0.129 216
DCP 3	.030	2.164	1.060 19	1.508 60	0.485 13	0.273 13	0.292 321	0.149 256	0.084 264	0.089 240	0.088 199
DCP 4	.049	2.319	1.425 13	1.016 51	0.393 9	0.228 336	0.187 284	0.116 225	0.083 201	0.068 150	0.053 97
DCP 5	.074	2.046	1.242 18	0.860 41	0.283 349	0.144 318	0.131 264	0.089 199	0.053 176	0.048 121	0.036 64
DCP 6	.099	1.869	1.140 23	0.782 33	0.253 328	0.112 295	0.114 246	0.086 175	0.044 149	0.039 104	0.038 55
DCP 7	.149	1.676	1.046 26	0.656 20	0.212 311	0.131 265	0.153 225	0.116 151	0.049 103	0.033 70	0.025 16
DCP 8	.200	1.237	0.946 29	0.557 20	0.217 316	0.164 274	0.155 215	0.128 158	0.077 102	0.047 41	0.027 3
DCP 9	.250	1.101	0.903 29	0.502 10	0.194 303	0.162 266	0.165 208	0.140 149	0.100 89	0.072 47	0.051 0
DCP10	.300	1.000	0.821 29	0.429 3	0.169 292	0.144 257	0.146 198	0.130 142	0.111 83	0.087 33	0.062 346
DCP11	.399	0.876	0.780 31	0.359 355	0.139 278	0.124 250	0.131 193	0.129 139	0.121 80	0.085 23	0.067 348
DCP12	.501	0.700	0.708 29	0.306 337	0.132 247	0.098 221	0.115 162	0.111 110	0.112 41	0.078 346	0.071 315
DCP13	.600	0.597	0.622 28	0.272 321	0.142 225	0.094 192	0.123 132	0.107 73	0.112 9	0.077 298	0.055 277
DCP14	.701	0.544	0.494 28	0.235 303	0.133 201	0.094 165	0.118 100	0.107 37	0.107 338	0.083 263	0.053 228
DCP15	.800	0.346	0.385 21	0.183 284	0.113 191	0.091 151	0.107 60	0.087 10	0.085 308	0.066 231	0.033 194
DCP16	.900	0.066	0.227 14	0.113 268	0.048 183	0.044 139	0.064 61	0.032 3	0.035 299	0.026 233	0.021 197
DCP17	.969	-0.002	0.096 17	0.074 276	0.033 197	0.027 134	0.027 47	0.027 348	0.030 274	0.021 202	0.019 [illegible]

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.086	0.401	10.36	0.0	0.02	12177.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
135.8 (445.5)	47875. (999.9)	0.64E 07	-0.070	1.077	10.61	-0.00090	0.984	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.025	10.43	0	0.986	352	0.150	321	0.043	26	0.04	97	0.034	125	0.020	196	0.013	102	0.008	17
CN		0.162	0.18	359	0.049	44	0.031	223	0.027	232	0.011	277	0.007	293	0.008	270	0.001	296	0.006	12
CM		-0.012	0.026	306	0.012	260	0.007	309	0.009	2	0.006	55	0.004	108	0.002	117	0.000	39	0.002	126
DCP 1	.010	0.447	5.118	353	1.303	258	0.897	309	0.558	38	0.087	107	0.250	32	0.271	85	0.215	179	0.078	206
DCP 2	.020	0.319	3.985	356	0.661	259	0.534	299	0.265	32	0.112	63	0.101	299	0.064	124	0.171	133	0.031	274
DCP 3	.030	0.172	3.892	355	0.093	315	0.219	283	0.113	338	0.071	112	0.045	198	0.017	347	0.044	152	0.029	244
DCP 4	.049	0.444	3.111	356	0.126	269	0.243	287	0.147	334	0.099	91	0.074	171	0.043	300	0.034	74	0.044	179
DCP 5	.074	0.425	2.674	356	0.058	28	0.148	247	0.118	299	0.066	45	0.052	147	0.042	265	0.032	34	0.037	133
DCP 6	.099	0.460	2.293	356	0.105	52	0.117	233	0.102	289	0.055	36	0.050	151	0.054	257	0.042	354	0.037	87
DCP 7	.149	0.273	1.823	356	0.164	57	0.110	195	0.100	259	0.046	353	0.027	129	0.037	245	0.030	334	0.036	66
DCP 8	.200	0.209	1.499	359	0.158	59	0.100	182	0.094	248	0.052	334	0.019	90	0.030	242	0.028	326	0.042	59
DCP 9	.250	0.173	1.298	357	0.161	49	0.087	157	0.081	216	0.043	292	0.013	334	0.014	335	0.021	303	0.026	1
DCP10	.300	0.166	1.100	357	0.158	48	0.093	144	0.086	201	0.050	269	0.025	330	0.017	242	0.016	279	0.025	351
DCP11	.399	0.168	0.837	3	0.107	49	0.047	143	0.062	196	0.045	257	0.029	314	0.006	321	0.004	277	0.015	344
DCP12	.501	0.137	0.619	5	0.065	47	0.021	137	0.042	184	0.034	241	0.027	295	0.011	336	0.003	105	0.006	277
DCP13	.600	0.153	0.452	9	0.039	62	0.011	188	0.024	182	0.018	225	0.015	271	0.012	281	0.004	261	0.008	329
DCP14	.701	0.213	0.308	13	0.046	75	0.011	219	0.023	208	0.012	226	0.009	295	0.006	287	0.009	158	0.007	278
DCP15	.800	0.101	0.172	24	0.033	90	0.013	233	0.023	194	0.012	223	0.013	287	0.005	293	0.004	157	0.006	298
DCP16	.900	-0.063	0.055	74	0.019	169	0.012	216	0.017	186	0.012	210	0.015	280	0.004	281	0.002	179	0.003	229
DCP17	.969	-0.041	0.032	155	0.008	123	0.011	197	0.012	168	0.005	229	0.009	291	0.004	270	0.004	48	0.005	352

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.94	0.087	0.398	10.35	0.0	2.50	12177.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.8 (442.4)	47363. (989.2)	0.64E 07	-0.051	1.245	12.96	-0.00092	0.999	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	P	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.500	10.351	0	0.988	351	0.148	315	0.012	351	0.039	148	0.010	17	0.046	167	0.032	131	0.019	20
CN		0.323	0.850	0	0.143	16	0.065	277	0.019	171	0.017	24	0.007	277	0.007	175	0.001	322	0.004	16
CM		-0.011	0.031	306	0.003	66	0.010	20	0.007	249	0.008	148	0.004	47	0.001	304	0.000	156	0.001	221
DCP 1	.010	0.591	5.329	350	0.780	43	0.882	337	0.595	312	0.528	148	0.468	132	0.081	263	0.075	284	0.101	23
DCP 2	.020	0.615	4.176	354	0.714	33	0.479	329	0.305	264	0.197	172	0.178	107	0.075	52	0.104	334	0.076	334
DCP 3	.030	0.775	3.828	354	0.669	26	0.244	314	0.256	234	0.135	163	0.131	82	0.083	352	0.117	311	0.034	271
DCP 4	.049	0.926	3.104	355	0.481	19	0.184	307	0.152	223	0.029	149	0.081	21	0.019	31	0.028	197	0.029	222
DCP 5	.074	0.902	2.539	355	0.403	14	0.144	297	0.113	195	0.034	69	0.076	341	0.019	256	0.036	147	0.013	128
DCP 6	.099	0.847	2.084	356	0.362	20	0.143	299	0.096	201	0.040	84	0.062	346	0.022	238	0.030	143	0.012	77
DCP 7	.149	0.642	1.606	357	0.283	13	0.124	279	0.085	178	0.051	60	0.047	336	0.015	208	0.011	107	0.014	247
DCP 8	.200	0.522	1.323	0	0.225	12	0.102	273	0.081	163	0.049	46	0.036	317	0.015	189	0.008	42	0.008	241
DCP 9	.250	0.453	1.144	359	0.193	0	0.093	248	0.066	129	0.054	13	0.047	289	0.027	178	0.012	126	0.012	57
DCP10	.300	0.420	0.951	0	0.156	359	0.078	249	0.047	113	0.047	17	0.027	271	0.022	187	0.006	181	0.010	56
DCP11	.399	0.346	0.760	5	0.126	10	0.063	250	0.036	114	0.039	1	0.026	260	0.020	169	0.005	94	0.003	89
DCP12	.501	0.252	0.569	8	0.103	14	0.054	254	0.031	114	0.036	358	0.023	246	0.017	157	0.008	359	0.006	5
DCP13	.600	0.220	0.415	13	0.084	23	0.049	256	0.018	116	0.026	352	0.018	238	0.010	138	0.002	333	0.008	20
DCP14	.701	0.244	0.260	20	0.079	37	0.044	264	0.012	97	0.026	328	0.015	206	0.006	90	0.006	352	0.005	16
DCP15	.800	0.172	0.160	27	0.032	30	0.030	236	0.012	40	0.022	314	0.013	178	0.006	57	0.003	285	0.005	28
DCP16	.900	-0.052	0.070	41	0.026	247	0.028	205	0.023	20	0.020	299	0.006	187	0.007	7	0.007	285	0.002	178
DCP17	.969	-0.038	0.018	142	0.026	251	0.023	192	0.008	54	0.008	317	0.006	147	0.005	221	0.003	199	0.002	16

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.92	0.087	0.397	10.31	0.0	4.95	12177.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.3 (440.6)	47071. (983.1)	0.64E 07	-0.121	1.464	15.12	-0.00091	0.981	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.948	10.309	0	0.962	353	0.189	329	0.028	300	0.040	224	0.067	130	0.045	283	0.033	168	0.023	61
CN		0.482	0.749	4	0.233	23	0.090	295	0.035	198	0.021	136	0.021	55	0.022	319	0.014	245	0.009	160
CM		-0.016	0.029	299	0.024	114	0.024	21	0.016	291	0.009	229	0.008	173	0.007	113	0.007	22	0.004	314
DCP 1	.010	1.490	4.737	348	1.341	62	0.777	29	0.451	306	0.264	255	0.126	240	0.186	218	0.087	176	0.110	116
DCP 2	.020	1.341	3.505	353	0.986	53	0.526	4	0.275	315	0.172	262	0.100	211	0.107	214	0.079	155	0.110	98
DCP 3	.030	1.308	2.804	353	0.959	59	0.618	4	0.389	304	0.272	239	0.170	173	0.089	134	0.064	64	0.059	59
DCP 4	.049	1.389	2.415	356	0.799	46	0.461	342	0.232	273	0.136	206	0.079	132	0.015	67	0.031	10	0.016	11
DCP 5	.074	1.268	1.959	357	0.693	42	0.385	332	0.195	255	0.111	182	0.069	112	0.020	44	0.042	5	0.032	319
DCP 6	.099	1.164	1.636	359	0.611	40	0.319	326	0.158	243	0.085	166	0.047	97	0.015	10	0.031	3	0.023	308
DCP 7	.149	0.908	1.324	1	0.471	28	0.244	308	0.125	220	0.058	148	0.038	104	0.020	40	0.034	351	0.024	290
DCP 8	.200	0.740	1.112	5	0.385	28	0.192	306	0.099	215	0.058	156	0.051	100	0.038	29	0.037	346	0.026	259
DCP 9	.250	0.660	1.001	5	0.335	15	0.160	283	0.081	196	0.053	133	0.049	81	0.045	6	0.038	309	0.021	243
DCP10	.300	0.602	0.964	6	0.292	10	0.145	273	0.085	182	0.060	125	0.052	63	0.054	348	0.039	283	0.022	221
DCP11	.399	0.512	0.749	11	0.235	6	0.124	261	0.076	165	0.046	104	0.049	52	0.047	344	0.033	271	0.021	209
DCP12	.501	0.383	0.566	14	0.181	3	0.096	248	0.058	143	0.035	85	0.038	37	0.047	322	0.038	237	0.026	183
DCP13	.600	0.321	0.496	17	0.146	0	0.080	235	0.055	126	0.031	58	0.031	13	0.041	309	0.035	216	0.026	147
DCP14	.701	0.220	0.288	23	0.108	2	0.066	221	0.052	107	0.025	34	0.028	346	0.034	284	0.032	194	0.019	116
DCP15	.800	0.178	0.211	24	0.078	332	0.065	200	0.051	100	0.027	30	0.028	335	0.024	261	0.026	173	0.012	108
DCP16	.900	-0.029	0.121	21	0.060	291	0.047	194	0.028	97	0.017	43	0.025	333	0.023	241	0.024	177	0.013	92
DCP17	.969	-0.095	0.021	42	0.046	279	0.025	212	0.012	130	0.007	86	0.015	353	0.010	260	0.013	192	0.011	100

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.98	0.087	0.396	10.32	0.0	7.51	12177.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.9 (439.4)	46927. (980.1)	0.64E 07	-0.181	1.638	16.08	-0.00106	1.135	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.512	10.325	0	0.941	358	0.163	347	0.075	16	0.080	315	0.129	217	0.078	114	0.042	45	0.009	358
CN		0.638	0.620	12	0.282	31	0.084	325	0.046	286	0.036	212	0.022	170	0.030	114	0.024	47	0.016	337
CM		-0.027	0.048	228	0.038	118	0.022	38	0.011	22	0.016	330	0.011	267	0.009	245	0.011	178	0.007	112
DCP 1	.010	2.336	3.117	344	1.613	77	0.804	34	0.297	8	0.310	349	0.204	298	0.132	311	0.111	241	0.065	224
DCP 2	.020	1.883	2.362	353	1.290	70	0.538	32	0.296	11	0.221	340	0.161	296	0.093	276	0.077	223	0.062	227
DCP 3	.030	1.750	1.824	352	1.296	72	0.643	22	0.293	342	0.166	324	0.157	287	0.110	253	0.109	196	0.081	173
DCP 4	.049	1.762	1.619	0	1.040	59	0.459	1	0.189	328	0.125	307	0.116	253	0.053	195	0.060	168	0.030	126
DCP 5	.074	1.585	1.336	3	0.911	52	0.356	349	0.118	319	0.103	297	0.099	237	0.050	166	0.048	150	0.034	105
DCP 6	.099	1.449	1.138	6	0.777	48	0.282	342	0.090	313	0.092	289	0.095	227	0.055	154	0.044	137	0.033	91
DCP 7	.149	1.153	1.010	10	0.580	37	0.208	329	0.065	302	0.085	259	0.071	205	0.049	146	0.042	118	0.026	54
DCP 8	.200	0.966	0.905	13	0.461	36	0.165	331	0.089	302	0.083	252	0.064	203	0.053	151	0.039	111	0.031	50
DCP 9	.250	0.864	0.828	13	0.414	27	0.142	321	0.091	269	0.090	232	0.068	185	0.064	134	0.054	97	0.044	45
DCP10	.300	0.777	0.728	15	0.350	23	0.125	316	0.094	278	0.087	215	0.057	170	0.059	127	0.060	83	0.046	21
DCP11	.399	0.666	0.658	20	0.280	17	0.088	302	0.069	280	0.076	214	0.048	166	0.063	130	0.063	76	0.045	14
DCP12	.501	0.522	0.556	22	0.223	6	0.069	278	0.050	264	0.069	192	0.042	141	0.054	112	0.055	45	0.045	343
DCP13	.600	0.434	0.456	25	0.187	357	0.069	254	0.042	236	0.065	168	0.040	107	0.045	90	0.056	18	0.042	308
DCP14	.701	0.416	0.341	29	0.151	345	0.073	227	0.030	206	0.060	152	0.043	82	0.040	60	0.057	348	0.042	277
DCP15	.800	0.254	0.277	26	0.125	321	0.068	220	0.038	196	0.061	137	0.046	69	0.032	39	0.048	336	0.032	267
DCP16	.900	0.016	0.178	20	0.091	300	0.045	229	0.035	193	0.042	121	0.028	59	0.030	27	0.036	322	0.024	247
DCP17	.969	-0.027	0.051	24	0.048	291	0.019	243	0.025	215	0.020	135	0.009	76	0.009	45	0.016	341	0.008	249

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.088	0.396	10.25	0.0	9.99	12177.5	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TPR	EXT DAMP
134.7 (438.5)	46860. (978.7)	0.648 07	-0.223	1.739	17.13	-0.00131	1.404	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.990	10.254	0	0.943	358	0.122	347	0.091	36	0.018	42	0.141	320	0.221	175	0.058	123	0.033	99
CN		0.763	0.509	26	0.304	35	0.076	358	0.045	313	0.021	300	0.037	266	0.044	182	0.008	162	0.016	115
CM		-0.037	0.069	219	0.044	125	0.020	88	0.022	57	0.011	17	0.016	4	0.012	312	0.010	251	0.009	240
DCP 1	.010	2.870	1.646	340	1.820	82	0.673	59	0.409	60	0.274	40	0.226	28	0.162	35	0.083	325	0.074	4
DCP 2	.020	2.407	1.380	355	1.430	76	0.496	58	0.275	49	0.186	48	0.201	19	0.089	27	0.112	324	0.050	328
DCP 3	.030	2.168	0.950	353	1.381	78	0.478	51	0.246	60	0.287	43	0.257	356	0.065	336	0.116	324	0.119	306
DCP 4	.049	2.051	0.866	14	1.184	63	0.300	39	0.241	39	0.157	6	0.154	339	0.065	272	0.074	265	0.050	257
DCP 5	.074	1.840	0.716	23	0.976	53	0.271	33	0.190	42	0.139	323	0.164	336	0.044	217	0.112	234	0.075	273
DCP 6	.099	1.542	0.708	27	0.827	52	0.161	29	0.183	24	0.104	337	0.138	326	0.084	251	0.064	242	0.057	222
DCP 7	.149	1.341	0.751	28	0.622	41	0.134	16	0.148	0	0.087	316	0.105	304	0.097	228	0.055	223	0.056	192
DCP 8	.200	1.136	0.709	29	0.502	42	0.147	16	0.127	342	0.067	313	0.098	298	0.094	224	0.045	229	0.055	193
DCP 9	.250	1.022	0.693	27	0.430	32	0.134	357	0.101	314	0.055	298	0.094	274	0.098	205	0.050	196	0.058	151
DCP10	.300	0.919	0.623	28	0.359	29	0.117	357	0.096	308	0.046	292	0.087	269	0.092	199	0.042	189	0.052	140
DCP11	.399	0.794	0.603	31	0.297	24	0.098	349	0.089	297	0.039	280	0.073	263	0.084	204	0.036	188	0.050	146
DCP12	.501	0.636	0.546	32	0.243	11	0.080	326	0.078	277	0.033	256	0.067	239	0.077	187	0.034	144	0.051	117
DCP13	.600	0.531	0.480	33	0.208	357	0.069	302	0.078	256	0.036	215	0.063	209	0.073	156	0.038	95	0.046	83
DCP14	.701	0.492	0.391	37	0.185	342	0.062	274	0.078	239	0.040	188	0.063	184	0.068	125	0.048	64	0.050	45
DCP15	.800	0.320	0.334	31	0.155	325	0.068	267	0.080	228	0.043	181	0.064	166	0.062	103	0.049	44	0.044	23
DCP16	.900	0.093	0.222	22	0.106	312	0.051	271	0.051	217	0.023	182	0.040	160	0.028	90	0.029	44	0.025	18
DCP17	.969	-0.015	0.079	24	0.048	313	0.036	296	0.028	231	0.013	198	0.019	164	0.017	114	0.021	45	0.012	98

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.64	0.171	0.400	11.06	0.0	0.00	12179.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TPR	EXT DAMP
135.9 (446.0)	48043. (1003.4)	0.648 07	-0.096	1.005	11.33	-0.00082	0.916	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.004	11.064	0	1.193	355	0.376	320	0.054	208	0.071	178	0.051	107	0.040	128	0.040	199	0.010	172
CN		0.160	0.905	1	0.113	41	0.032	67	0.020	152	0.013	189	0.005	207	0.003	203	0.003	194	0.004	163
CM		-0.012	0.045	291	0.015	251	0.012	253	0.011	288	0.005	310	0.003	15	0.001	54	0.001	227	0.002	316
DCP 1	.010	0.540	5.009	350	1.019	239	0.874	278	0.433	352	0.031	184	0.242	316	0.278	3	0.106	84	0.049	45
DCP 2	.020	0.277	3.856	355	0.303	236	0.514	289	0.265	321	0.027	50	0.070	293	0.103	350	0.108	68	0.049	104
DCP 3	.030	0.206	3.811	352	0.174	4	0.178	295	0.121	318	0.060	107	0.051	166	0.015	292	0.018	180	0.023	230
DCP 4	.049	0.437	3.129	354	0.090	33	0.176	256	0.191	288	0.072	15	0.060	115	0.045	240	0.044	334	0.041	81
DCP 5	.074	0.399	2.694	353	0.240	41	0.074	192	0.144	254	0.057	326	0.043	82	0.043	208	0.050	296	0.046	35
DCP 6	.099	0.422	2.300	354	0.269	42	0.063	152	0.107	241	0.056	308	0.040	74	0.043	180	0.045	268	0.029	358
DCP 7	.149	0.258	1.819	354	0.299	40	0.114	116	0.102	205	0.054	268	0.025	42	0.033	164	0.048	236	0.031	309
DCP 8	.200	0.217	1.461	0	0.251	44	0.105	104	0.079	194	0.054	258	0.014	11	0.027	150	0.046	234	0.037	294
DCP 9	.250	0.166	1.292	356	0.257	32	0.123	80	0.079	158	0.054	215	0.039	309	0.031	122	0.044	169	0.035	222
DCP10	.300	0.159	1.177	357	0.235	28	0.127	66	0.084	133	0.058	190	0.021	245	0.015	57	0.030	140	0.035	186
DCP11	.399	0.158	0.833	7	0.168	37	0.096	61	0.070	123	0.043	181	0.025	236	0.007	315	0.014	123	0.025	183
DCP12	.501	0.137	0.617	13	0.109	43	0.057	53	0.044	96	0.026	142	0.019	194	0.005	277	0.007	90	0.016	137
DCP13	.600	0.155	0.469	21	0.087	55	0.047	55	0.034	103	0.015	156	0.012	216	0.008	297	0.013	35	0.007	109
DCP14	.701	0.214	0.326	27	0.074	60	0.033	49	0.027	89	0.022	110	0.011	198	0.011	251	0.009	350	0.011	76
DCP15	.800	0.104	0.207	41	0.055	79	0.026	70	0.027	97	0.014	87	0.009	158	0.007	212	0.002	331	0.003	120
DCP16	.900	-0.060	0.107	80	0.046	114	0.018	140	0.019	119	0.010	107	0.007	146	0.007	122	0.005	356	0.004	97
DCP17	.969	-0.039	0.056	137	0.022	131	0.014	110	0.022	148	0.007	107	0.009	196	0.006	308	0.004	32	0.004	46

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.47	0.172	0.398	11.07	0.0	2.48	12179.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.8 (442.3)	47478. (991.6)	0.64E 07	-0.076	1.223	13.60	-0.00093	1.023	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.483	11.066	0	1.198	357	0.406	325	0.034	310	0.061	186	0.031	112	0.030	137	0.040	197	0.005	158
CN		0.337	0.850	4	0.123	9	0.013	250	0.007	330	0.014	278	0.006	111	0.004	20	0.005	273	0.003	224
CM		-0.009	0.055	294	0.004	304	0.010	319	0.007	177	0.006	71	0.002	309	0.002	171	0.001	109	0.001	101
DCP 1	.010	0.656	5.490	346	0.820	25	0.774	318	0.495	271	0.454	102	0.293	88	0.170	176	0.023	85	0.137	306
DCP 2	.020	0.725	4.300	353	0.658	16	0.379	316	0.272	233	0.131	143	0.151	63	0.075	26	0.063	285	0.050	262
DCP 3	.030	0.857	3.878	352	0.602	11	0.171	304	0.244	206	0.090	126	0.124	32	0.072	306	0.102	256	0.029	183
DCP 4	.049	0.981	3.123	353	0.423	2	0.131	307	0.113	199	0.009	114	0.066	340	0.025	333	0.023	166	0.049	164
DCP 5	.074	0.961	2.560	353	0.336	354	0.079	287	0.051	149	0.039	344	0.047	280	0.019	170	0.012	101	0.018	117
DCP 6	.099	0.894	2.122	355	0.313	2	0.069	290	0.056	152	0.028	350	0.049	287	0.017	188	0.016	91	0.017	98
DCP 7	.149	0.686	1.629	357	0.231	353	0.053	249	0.045	113	0.049	343	0.026	259	0.013	135	0.012	229	0.020	152
DCP 8	.200	0.557	1.334	3	0.179	0	0.032	236	0.034	94	0.044	334	0.021	229	0.013	128	0.006	80	0.005	156
DCP 9	.250	0.482	1.155	5	0.149	351	0.034	170	0.040	46	0.048	289	0.016	199	0.009	119	0.001	121	0.007	11
DCP10	.300	0.431	0.955	3	0.125	356	0.025	149	0.036	15	0.044	279	0.021	163	0.014	60	0.010	263	0.002	221
DCP11	.399	0.356	0.764	14	0.102	16	0.027	137	0.030	24	0.035	293	0.018	186	0.011	68	0.014	335	0.009	251
DCP12	.501	0.260	0.588	19	0.087	18	0.023	151	0.024	4	0.028	267	0.017	144	0.014	19	0.006	305	0.007	243
DCP13	.600	0.223	0.444	28	0.076	29	0.018	140	0.022	0	0.026	262	0.014	104	0.015	348	0.006	286	0.005	261
DCP14	.701	0.245	0.309	41	0.074	31	0.022	170	0.021	4	0.023	247	0.019	102	0.011	324	0.005	239	0.001	42
DCP15	.800	0.116	0.210	52	0.038	39	0.022	149	0.027	332	0.019	224	0.012	64	0.009	294	0.003	200	0.007	301
DCP16	.900	-0.063	0.101	67	0.016	189	0.029	137	0.025	300	0.013	197	0.003	75	0.002	51	0.012	297	0.007	121
DCP17	.969	-0.050	0.045	131	0.016	238	0.017	148	0.012	303	0.008	218	0.002	351	0.006	351	0.004	200	0.009	263

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	45.56	0.173	0.396	11.00	0.0	4.91	12179.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.0 (439.7)	47105. (983.8)	0.64E 07	-0.126	1.518	16.08	-0.00069	0.761	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.914	11.000	0	1.242	0	0.460	318	0.087	78	0.042	159	0.023	172	0.035	109	0.063	173	0.012	143
CN		0.489	0.845	12	0.192	350	0.039	216	0.014	109	0.024	4	0.012	259	0.005	195	0.009	152	0.010	45
CM		-0.020	0.047	252	0.031	64	0.031	317	0.017	216	0.012	145	0.007	45	0.002	305	0.002	276	0.004	187
DCP 1	.010	1.202	4.494	349	1.444	43	0.728	358	0.482	260	0.202	218	0.086	230	0.131	177	0.141	112	0.064	52
DCP 2	.020	1.179	3.442	357	1.037	38	0.576	342	0.288	276	0.148	242	0.142	196	0.119	141	0.091	92	0.059	42
DCP 3	.030	1.149	2.732	359	1.061	37	0.646	329	0.342	252	0.121	198	0.089	179	0.120	131	0.121	71	0.092	2
DCP 4	.049	1.358	2.578	0	0.762	20	0.403	311	0.195	225	0.057	137	0.010	158	0.044	114	0.040	58	0.040	337
DCP 5	.074	1.268	2.117	2	0.664	12	0.286	297	0.167	208	0.052	87	0.039	114	0.025	21	0.042	351	0.034	227
DCP 6	.099	1.166	1.812	4	0.562	11	0.243	288	0.110	191	0.037	85	0.014	104	0.030	51	0.026	310	0.016	253
DCP 7	.149	0.931	1.505	7	0.443	355	0.182	260	0.093	156	0.040	82	0.036	70	0.046	354	0.038	253	0.011	196
DCP 8	.200	0.782	1.295	13	0.370	354	0.153	250	0.092	148	0.051	83	0.047	41	0.037	323	0.030	236	0.003	227
DCP 9	.250	0.687	1.164	11	0.330	339	0.143	221	0.074	140	0.059	67	0.062	9	0.048	287	0.038	216	0.018	159
DCP10	.300	0.625	1.010	12	0.268	331	0.119	202	0.059	119	0.058	50	0.058	338	0.043	255	0.029	200	0.023	136
DCP11	.399	0.538	0.875	20	0.201	327	0.115	186	0.061	104	0.061	43	0.050	318	0.039	263	0.040	213	0.038	131
DCP12	.501	0.410	0.699	22	0.149	315	0.111	163	0.041	70	0.060	10	0.047	280	0.028	212	0.029	162	0.040	86
DCP13	.600	0.332	0.541	29	0.107	310	0.106	148	0.067	48	0.064	337	0.046	241	0.023	165	0.027	136	0.043	48
DCP14	.701	0.329	0.398	35	0.076	290	0.108	129	0.069	23	0.057	315	0.047	211	0.023	120	0.020	84	0.035	2
DCP15	.800	0.187	0.277	35	0.074	251	0.097	121	0.057	10	0.047	301	0.036	202	0.022	95	0.019	54	0.030	334
DCP16	.900	-0.028	0.141	31	0.069	245	0.063	120	0.040	7	0.040	296	0.032	168	0.023	68	0.018	31	0.027	293
DCP17	.969	-0.042	0.024	57	0.048	252	0.029	132	0.017	7	0.020	283	0.018	207	0.012	81	0.014	38	0.005	303

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FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	45.67	0.174	0.395	10.85	0.0	7.50	12179.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
133.7 (438.6)	46932. (980.2)	0.64E 07	-0.239	1.783	18.75	-0.00049	0.542	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.504	10.850 0	1.268 359	0.494 314	0.194 118	0.043 138	0.026 235	0.076 131	0.039 211	0.005 229
CN		0.690	0.820 17	0.223 352	0.034 270	0.024 183	0.023 54	0.011 54	0.010 260	0.018 268	0.015 127
CM		-0.039	0.076 215	0.063 74	0.041 337	0.025 267	0.014 200	0.006 109	0.004 121	0.006 36	0.004 304
DCP 1	.010	1.983	2.869 348	1.789 62	0.967 359	0.368 298	0.191 333	0.200 287	0.102 242	0.145 206	0.062 158
DCP 2	.020	1.716	2.359 359	1.405 60	0.718 0	0.291 317	0.118 335	0.154 307	0.151 250	0.140 204	0.056 171
DCP 3	.030	1.649	1.924 2	1.327 56	0.703 351	0.274 302	0.116 324	0.169 279	0.146 214	0.112 183	0.071 157
DCP 4	.049	1.789	1.960 6	0.937 41	0.423 340	0.160 313	0.122 299	0.118 240	0.102 175	0.062 138	0.038 80
DCP 5	.074	1.828	1.399 4	1.023 13	0.290 30	0.368 297	0.355 319	0.297 117	0.294 204	0.224 347	0.253 95
DCP 6	.099	1.503	1.493 13	0.698 26	0.277 318	0.107 290	0.092 249	0.086 181	0.069 138	0.049 103	0.046 38
DCP 7	.149	1.223	1.328 15	0.540 11	0.217 301	0.113 258	0.108 192	0.077 119	0.042 95	0.037 57	0.044 354
DCP 8	.200	1.034	1.196 21	0.469 12	0.217 305	0.137 244	0.119 182	0.081 122	0.046 106	0.047 53	0.046 5
DCP 9	.250	0.920	1.113 18	0.401 353	0.187 281	0.146 220	0.141 142	0.089 75	0.047 40	0.054 342	0.041 294
DCP10	.300	0.842	1.008 19	0.348 344	0.157 270	0.133 206	0.137 125	0.088 55	0.051 17	0.062 312	0.039 245
DCP11	.399	0.737	0.926 25	0.280 336	0.118 254	0.116 197	0.132 122	0.090 58	0.067 10	0.078 308	0.047 230
DCP12	.501	0.591	0.796 25	0.227 319	0.106 209	0.100 151	0.109 86	0.077 22	0.069 329	0.083 268	0.060 193
DCP13	.600	0.517	0.700 26	0.235 290	0.158 176	0.116 108	0.104 48	0.065 341	0.061 291	0.077 233	0.064 155
DCP14	.701	0.484	0.535 26	0.220 269	0.192 149	0.135 76	0.110 9	0.070 279	0.053 233	0.049 181	0.051 100
DCP15	.800	0.299	0.401 23	0.205 254	0.167 139	0.125 63	0.107 338	0.064 239	0.030 190	0.030 139	0.034 57
DCP16	.900	0.034	0.222 12	0.137 237	0.098 122	0.065 45	0.056 308	0.038 217	0.015 177	0.019 127	0.026 33
DCP17	.969	-0.017	0.072 9	0.081 251	0.048 135	0.039 59	0.040 307	0.029 191	0.014 88	0.009 108	0.008 96

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
C.C	68.10	0.254	0.405	11.68	0.0	-0.10	12187.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
136.2 (447.0)	48555. (1014.1)	0.64E 07	-0.112	1.042	12.23	-0.00075	0.857	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		-0.095	11.684 0	2.131 346	0.265 196	0.130 161	0.037 81	0.019 155	0.048 125	0.022 110	0.020 216
CN		0.118	0.888 6	0.189 28	0.008 352	0.007 18	0.016 93	0.010 130	0.007 135	0.001 244	0.003 238
CM		-0.013	0.060 286	0.024 253	0.015 174	0.011 200	0.006 254	0.003 273	0.002 299	0.001 299	0.001 85
DCP 1	.010	0.360	4.804 351	0.894 244	0.918 235	0.291 323	0.039 22	0.196 245	0.255 308	0.080 318	0.009 174
DCP 2	.020	0.121	3.802 357	0.341 281	0.507 244	0.196 296	0.081 19	0.085 252	0.115 285	0.062 14	0.077 68
DCP 3	.030	0.048	3.655 352	0.361 345	0.243 231	0.166 295	0.112 29	0.086 123	0.069 167	0.016 5	0.039 140
DCP 4	.049	0.286	3.026 355	0.287 7	0.268 206	0.190 255	0.057 351	0.064 123	0.055 216	0.078 299	0.044 26
DCP 5	.074	0.317	2.254 356	0.426 23	0.165 154	0.149 213	0.063 286	0.043 53	0.061 134	0.055 216	0.042 279
DCP 6	.149	0.168	1.776 356	0.441 23	0.146 119	0.130 179	0.047 244	0.025 9	0.057 104	0.049 177	0.044 239
DCP 7	.200	0.128	1.463 3	0.404 30	0.121 103	0.107 171	0.055 224	0.031 336	0.039 93	0.051 147	0.049 209
DCP 8	.250	0.107	1.275 358	0.393 18	0.117 66	0.097 121	0.055 162	0.017 242	0.027 36	0.034 86	0.032 131
DCP 9	.300	0.110	1.061 359	0.345 12	0.111 35	0.083 87	0.063 134	0.038 206	0.023 307	0.039 17	0.036 86
DCP10	.399	0.120	0.829 15	0.272 32	0.098 29	0.072 80	0.070 136	0.037 199	0.015 284	0.029 23	0.021 92
DCP11	.501	0.098	0.635 23	0.174 39	0.076 333	0.075 15	0.067 83	0.030 134	0.018 194	0.022 289	0.028 327
DCP12	.600	0.124	0.486 33	0.142 48	0.060 330	0.048 6	0.033 58	0.021 103	0.013 169	0.016 228	0.022 273
DCP13	.701	0.198	0.365 41	0.117 64	0.060 310	0.058 345	0.037 55	0.026 88	0.026 125	0.018 176	0.021 234
DCP14	.800	0.095	0.246 58	0.089 74	0.034 338	0.032 340	0.024 19	0.023 69	0.015 99	0.011 97	0.005 220
DCP15	.900	-0.057	0.141 83	0.066 91	0.022 334	0.026 0	0.007 357	0.007 35	0.006 67	0.003 331	0.004 72

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.53	0.259	0.400	11.65	0.0	2.49	12187.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
134.6 (441.5)	47646. (995.1)	0.64E 07	-0.105	1.264	15.12	-0.00089	0.997	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.493	11.655	0	2.159	349	0.290	184	0.119	163	0.018	148	0.022	150	0.031	139	0.026	118	0.012	212
CN		0.329	0.852	10	0.165	15	0.029	202	0.016	308	0.008	200	0.005	73	0.004	209	0.004	201	0.003	189
CM		-0.012	0.079	96	0.019	290	0.005	271	0.011	158	0.005	27	0.002	276	0.001	104	0.002	15	0.000	345
DCP 1	.010	0.665	4.995	364	0.8[illegible]	1	0.655	288	0.573	259	0.359	65	0.401	50	0.125	111	0.051	104	0.057	269
DCP 2	.020	0.634	4.675	353	0.808	5	0.315	288	0.327	236	0.131	121	0.177	54	0.073	52	0.040	291	0.071	254
DCP 3	.030	0.781	3.740	352	0.774	359	0.171	248	0.257	195	0.127	95	0.132	23	0.051	256	0.097	230	0.020	249
DCP 4	.049	0.918	3.122	353	0.624	353	0.122	212	0.177	178	0.021	114	0.111	316	0.039	302	0.042	88	0.044	115
DCP 5	.099	0.939	2.104	356	0.456	359	0.077	208	0.087	151	0.011	75	0.070	264	0.024	220	0.023	44	0.[illegible]	78
DCP 6	.149	0.940	1.632	359	0.347	353	0.089	185	0.073	110	0.025	342	0.055	234	0.030	177	[illegible]	[illegible]	0.018	18
DCP 7	.200	0.[illegible]43	1.342	8	0.255	3	0.087	189	0.047	77	0.033	358	0.035	229	0.039	184	0.004	215	0.013	355
DCP 8	.250	0.488	1.175	5	0.209	359	0.075	162	0.051	24	0.039	274	0.040	174	0.019	143	0.001	278	0.018	317
DCP 9	.300	0.430	0.987	7	0.180	1	0.060	151	0.057	0	0.034	261	0.039	146	0.026	102	0.012	330	0.018	202
DCP10	.399	0.362	0.797	24	0.140	37	0.036	169	0.052	352	0.037	251	0.025	138	0.010	17	0.010	297	0.017	191
DCP11	.501	0.266	0.636	31	0.122	50	0.018	187	0.057	336	0.029	217	0.032	108	0.013	347	0.028	237	0.024	211
DCP12	.600	0.228	0.507	42	0.118	53	0.010	180	0.033	330	0.023	215	0.015	55	0.012	285	0.011	191	0.007	188
DCP13	.701	0.251	0.391	53	0.106	55	0.016	211	0.043	321	0.018	184	0.023	54	0.016	258	0.019	177	0.005	295
DCP14	.800	0.112	0.280	64	0.073	66	0.009	83	0.033	323	0.017	165	0.013	15	0.005	255	0.009	92	0.006	92
DCP15	.900	-0.063	0.148	76	0.048	113	0.016	54	0.031	285	0.018	139	0.006	327	0.004	188	0.007	187	0.014	33

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	69.94	0.267	0.397	11.66	0.0	5.00	12187.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
133.4 (437.7)	46927. (980.1)	0.64E 07	-0.122	1.515	17.91	-0.00062	0.691	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.001	11.663	0	2.356	349	0.240	160	0.100	163	0.033	164	0.015	176	0.037	160	0.033	127	0.036	189
CN		0.516	0.908	14	0.162	356	0.037	156	0.011	24	0.017	269	0.011	145	0.008	260	0.001	280	0.005	136
CM		-0.025	0.062	256	0.038	2	0.028	268	0.010	158	0.012	59	0.008	301	0.006	168	0.004	84	0.006	340
DCP 1	.010	1.064	4.423	344	1.722	23	0.690	351	0.429	240	0.253	182	0.065	165	0.145	138	0.074	91	0.044	358
DCP 2	.020	1.129	3.338	357	1.273	29	0.568	334	0.355	259	0.196	191	0.117	136	0.083	142	0.064	87	0.078	38
DCP 3	.030	1.157	2.823	358	1.182	22	0.524	314	0.296	233	0.133	169	0.089	142	0.118	112	0.111	28	0.082	323
DCP 4	.049	1.397	2.677	0	0.885	9	0.314	294	0.201	210	0.096	141	0.061	93	0.028	66	0.042	348	0.037	316
DCP 5	.099	1.223	1.943	5	0.670	359	0.222	252	0.130	169	0.061	98	0.057	59	0.057	324	0.047	270	0.021	237
DCP 6	.149	0.986	1.624	7	0.513	346	0.208	217	0.115	130	0.059	68	0.067	5	0.079	264	0.038	182	0.010	66
DCP 7	.200	0.824	1.431	16	0.412	346	0.214	215	0.123	138	0.090	76	0.104	4	0.100	280	0.058	205	0.033	141
DCP 8	.250	0.741	1.309	12	0.337	328	0.207	183	0.115	101	0.099	24	0.102	310	0.100	219	0.063	132	0.053	60
DCP 9	.300	0.686	1.157	12	0.252	316	0.175	166	0.106	83	0.110	1	0.102	269	0.090	183	0.067	99	0.046	36
DCP10	.399	0.573	0.963	24	0.132	326	0.162	165	0.120	73	0.126	346	0.102	249	0.056	173	0.047	105	0.049	48
DCP11	.501	0.434	0.790	29	0.056	295	0.161	135	0.130	34	0.140	289	0.113	182	0.044	100	0.054	27	0.085	289
DCP12	.600	0.356	0.621	35	0.036	202	0.142	109	0.127	354	0.117	254	0.089	145	0.054	47	0.060	349	0.075	237
DCP13	.701	0.348	0.456	42	0.086	163	0.136	69	0.099	312	0.096	211	0.084	108	0.056	348	0.081	273	0.087	168
DCP14	.800	0.201	0.294	41	0.128	156	0.114	43	0.088	290	0.083	184	0.059	72	0.050	332	0.062	239	0.060	129
DCP15	.900	-0.025	0.142	44	0.091	195	0.084	32	0.068	270	0.093	158	0.062	28	0.033	291	0.035	197	0.032	70

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	70.78	0.271	0.396	11.59	0.0	7.57	12187.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
133.0 (436.2)	46722. (975.8)	0.63E 07	-0.219	1.802	20.49	-0.00010	0.107	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		7.574	11.590 0	2.469 346	0.134 137	0.073 138	0.056 158	0.027 159	0.030 137	0.032 96	0.048 166
CN		0.744	0.940 15	0.150 355	0.012 136	0.013 215	0.013 108	0.019 318	0.014 171	0.010 33	0.011 107
CM		-0.060	0.074 197	0.077 8	0.039 258	0.011 144	0.002 154	0.007 89	0.011 308	0.008 176	0.006 10
DCP 1	.010	1.570	2.672 351	2.095 30	0.647 336	0.152 284	0.164 284	0.191 229	0.111 191	0.047 147	0.018 167
DCP 2	.020	1.569	2.351 5	1.701 36	0.540 335	0.130 286	0.113 307	0.155 255	0.102 207	0.057 154	0.038 130
DCP 3	.030	1.583	2.026 6	1.488 32	0.493 326	0.156 281	0.115 275	0.148 225	0.091 172	0.062 125	0.058 90
DCP 4	.049	1.823	2.156 5	1.029 25	0.308 339	0.272 280	0.204 208	0.109 136	0.031 38	0.031 126	0.036 55
DCP 5	.099	1.554	1.714 13	0.808 7	0.197 282	0.122 252	0.160 188	0.134 104	0.082 16	0.023 343	0.030 331
DCP 6	.149	1.290	1.530 16	0.667 352	0.207 247	0.114 212	0.151 146	0.115 55	0.073 332	0.026 279	0.018 276
DCP 7	.200	1.079	1.425 24	0.599 354	0.253 250	0.153 200	0.150 143	0.111 67	0.084 12	0.053 309	0.024 250
DCP 8	.250	0.971	1.337 20	0.521 335	0.270 223	0.195 152	0.155 82	0.117 13	0.098 307	0.067 229	0.028 171
DCP 9	.300	0.883	1.200 20	0.449 328	0.281 209	0.214 128	0.147 52	0.105 341	0.091 281	0.065 190	0.025 108
DCP10	.399	0.812	1.115 26	0.295 318	0.268 199	0.223 117	0.156 33	0.109 328	0.110 265	0.111 173	0.063 93
DCP11	.501	0.715	0.984 19	0.202 249	0.227 147	0.164 71	0.128 346	0.124 278	0.159 190	0.131 86	0.058 348
DCP12	.600	0.651	0.823 12	0.299 202	0.269 95	0.139 356	0.082 294	0.113 248	0.172 146	0.166 33	0.106 272
DCP13	.721	0.580	0.575 11	0.328 177	0.281 62	0.157 310	0.076 218	0.047 178	0.169 103	0.115 338	0.109 200
DCP14	.823	0.341	0.355 11	0.278 163	0.218 43	0.148 286	0.084 179	0.029 59	0.041 62	0.050 295	0.052 153
DCP15	.900	0.066	0.184 354	0.196 148	0.150 11	0.085 242	0.032 116	0.008 170	0.047 31	0.045 243	0.034 88

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	22.97	0.070	0.497	10.36	0.0	0.00	12181.1	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
167.2 (548.6)	73621. (1537.6)	0.80E 07	-0.071	1.187	10.60	-0.00095	1.268	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.004	10.365 0	0.958 351	0.151 325	0.060 17	0.055 141	0.034 125	0.051 189	0.024 128	0.017 3
CN		0.180	0.940 1	0.034 16	0.075 247	0.026 231	0.021 355	0.010 304	0.010 167	0.002 20	0.004 10
CM		-0.007	0.030 314	0.019 266	0.010 335	0.011 27	0.010 113	0.003 121	0.003 296	0.000 97	0.002 115
DCP 1	.010	0.387	4.606 353	1.035 262	0.962 320	0.127 332	0.082 183	0.259 41	0.017 95	0.037 35	0.051 40
DCP 2	.020	0.449	4.229 357	0.862 270	0.547 309	0.142 21	0.139 159	0.159 82	0.055 41	0.079 233	0.022 31
DCP 3	.030	0.429	4.188 356	0.542 276	0.331 281	0.143 40	0.128 149	0.082 103	0.084 38	0.073 255	0.009 187
DCP 4	.049	0.635	3.534 357	0.454 280	0.405 278	0.113 49	0.186 120	0.049 97	0.088 33	0.084 247	0.087 202
DCP 5	.074	.463	2.803 357	0.136 352	0.294 279	0.040 247	0.153 109	0.029 329	0.044 287	0.027 195	0.028 226
DCP 6	.099	0.475	2.380 358	0.076 21	0.247 263	0.048 314	0.140 75	0.046 273	0.081 257	0.047 127	0.034 105
DCP 7	.149	0.312	1.845 358	0.104 47	0.159 233	0.048 273	0.081 32	0.035 254	0.058 224	0.036 76	0.035 56
DCP 8	.200	0.259	1.533 0	0.083 38	0.138 223	0.029 268	0.084 15	0.033 268	0.049 219	0.028 62	0.031 65
DCP 9	.250	0.220	1.356 358	0.079 40	0.133 194	0.016 234	0.084 355	0.044 234	0.041 165	0.039 33	0.026 3
DCP10	.300	0.205	1.129 359	0.089 43	0.108 192	0.029 217	0.066 329	0.028 241	0.033 168	0.028 9	0.023 6
DCP11	.399	0.189	0.846 4	0.073 56	0.062 210	0.042 233	0.051 321	0.009 314	0.023 136	0.011 346	0.008 338
DCP12	.501	0.138	0.616 7	0.066 63	0.047 225	0.046 224	0.034 315	0.013 336	0.013 128	0.010 325	0.004 329
DCP13	.600	0.141	0.448 11	0.066 67	0.039 233	0.050 217	0.027 307	0.016 331	0.011 137	0.005 258	0.008 336
DCP14	.701	0.202	0.285 17	0.076 75	0.033 242	0.050 219	0.022 307	0.020 346	0.014 112	0.006 191	0.008 275
DCP15	.800	0.089	0.157 27	0.053 78	0.022 225	0.043 202	0.024 286	0.019 309	0.009 97	0.003 136	0.007 250
DCP16	.900	-0.074	0.051 67	0.018 157	0.029 179	0.027 191	0.025 275	0.011 277	0.006 81	0.005 202	0.004 261
DCP17	.969	-0.050	0.019 144	0.016 103	0.030 170	0.012 200	0.016 277	0.004 209	0.007 96	0.006 207	0.004 292

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.00	0.070	0.495	10.32	0.0	2.49	12181.2	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
166.2 (545.3)	73003. (1524.7)	0.796 07	-0.068	1.926	12.75	-0.00093	1.238	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.489	10.323	0	0.989	351	0.153	328	0.015	295	0.046	201	0.091	118	0.048	265	0.015	181	0.028	44
CN		0.321	0.847	1	0.176	31	0.107	300	0.059	222	0.017	122	0.018	40	0.014	299	0.009	262	0.005	136
CM		-0.014	0.093	305	0.008	100	0.018	39	0.013	300	0.011	207	0.009	133	0.005	97	0.003	25	0.003	311
DCP 1	.010	0.820	4.836	351	0.370	44	1.024	334	0.439	329	0.213	163	0.118	158	0.117	125	0.026	82	0.029	38
DCP 2	.020	0.764	4.194	353	0.474	50	0.725	351	0.492	303	0.340	199	0.213	146	0.049	147	0.062	49	0.036	325
DCP 3	.030	0.787	3.860	353	0.569	55	0.513	2	0.477	297	0.349	209	0.237	151	0.019	134	0.091	69	0.051	354
DCP 4	.049	0.876	3.165	355	0.697	44	0.470	334	0.356	272	0.192	193	0.182	148	0.054	209	0.038	91	0.089	42
DCP 5	.074	0.818	2.440	354	0.671	41	0.294	344	0.289	242	0.109	251	0.106	112	0.080	165	0.071	332	0.083	48
DCP 6	.099	0.785	2.140	356	0.554	42	0.226	322	0.231	238	0.073	295	0.073	81	0.032	66	0.015	330	0.030	322
DCP 7	.149	0.612	1.643	358	0.400	32	0.184	297	0.191	220	0.060	152	0.090	54	0.053	8	0.038	294	0.033	268
DCP 8	.200	0.500	1.329	1	0.313	31	0.164	301	0.140	221	0.053	148	0.071	59	0.048	17	0.030	301	0.037	260
DCP 9	.250	0.442	1.162	0	0.254	19	0.144	280	0.122	195	0.060	112	0.068	29	0.056	331	0.040	268	0.039	202
DCP10	.400	0.407	0.962	1	0.210	19	0.126	277	0.091	188	0.050	95	0.052	17	0.039	310	0.028	248	0.020	196
DCP11	.399	0.344	0.753	6	0.158	23	0.107	280	0.062	182	0.044	77	0.035	359	0.034	290	0.017	236	0.014	164
DCP12	.501	0.297	0.567	8	0.121	22	0.090	274	0.048	174	0.038	58	0.030	347	0.025	283	0.015	225	0.015	151
DCP13	.600	0.227	0.409	14	0.095	27	0.085	271	0.041	165	0.036	46	0.028	325	0.020	274	0.016	225	0.011	131
DCP14	.701	0.259	0.254	20	0.077	39	0.069	269	0.030	150	0.035	25	0.026	302	0.014	248	0.008	209	0.015	120
DCP15	.800	0.134	0.163	29	0.033	2	0.055	243	0.030	119	0.033	12	0.023	299	0.014	260	0.009	180	0.013	109
DCP16	.900	-0.050	0.071	51	0.043	264	0.026	116	0.023	5	0.021	304	0.014	272	0.009	190	0.012	87		
DCP17	.969	-0.138	0.026	141	0.030	261	0.033	219	0.011	144	0.011	41	0.010	333	0.014	273	0.003	231	0.008	98

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	23.01	0.071	0.494	10.22	0.0	4.93	12181.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
165.6 (543.3)	72721. (1518.8)	0.790 07	-0.134	1.441	13.99	-0.00099	1.256	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		4.934	10.218	0	0.966	352	0.126	327	0.045	17	0.025	329	0.110	259	0.130	112	0.057	57	0.036	322
CN		0.469	0.726	3	0.254	14	0.094	323	0.057	274	0.037	240	0.020	156	0.024	63	0.012	17	0.011	313
CM		-0.016	0.030	201	0.023	118	0.022	37	0.008	316	0.007	319	0.006	256	0.007	236	0.004	146	0.005	86
DCP 1	.010	1.312	4.335	348	1.414	62	0.716	359	0.317	325	0.140	5	0.164	208	0.114	221	0.079	234	0.008	349
DCP 2	.020	1.254	3.432	351	1.167	67	0.737	9	0.325	305	0.136	318	0.238	266	0.092	192	0.060	203	0.054	158
DCP 3	.030	1.288	3.056	350	1.071	70	0.663	22	0.314	308	0.165	296	0.246	279	0.110	203	0.088	196	0.081	146
DCP 4	.049	1.313	2.421	350	1.027	51	0.479	356	0.216	307	0.226	277	0.145	252	0.023	197	0.074	152	0.060	143
DCP 5	.074	1.306	1.771	353	0.814	39	0.414	15	0.153	244	0.263	292	0.016	34	0.131	169	0.054	273	0.088	62
DCP 6	.099	1.144	1.633	358	0.669	48	0.305	344	0.131	245	0.097	258	0.075	211	0.044	111	0.038	97	0.027	80
DCP 7	.149	0.884	1.235	1	0.547	38	0.237	327	0.106	277	0.077	230	0.076	176	0.065	103	0.043	59	0.034	19
DCP 8	.200	0.726	1.048	4	0.367	37	0.164	328	0.073	288	0.068	260	0.064	182	0.069	106	0.040	62	0.032	18
DCP 9	.250	0.648	0.975	9	0.338	28	0.145	314	0.078	264	0.066	234	0.053	143	0.054	77	0.038	35	0.035	334
DCP10	.300	0.564	0.837	4	0.296	24	0.124	303	0.059	253	0.056	196	0.050	136	0.052	72	0.039	23	0.034	319
DCP11	.349	0.491	0.696	13	0.238	24	0.095	297	0.038	247	0.039	233	0.049	137	0.045	80	0.021	31	0.031	324
DCP12	.501	0.372	0.568	12	0.181	18	0.071	278	0.015	205	0.020	201	0.048	123	0.037	69	0.023	6	0.024	306
DCP13	.600	0.310	0.417	17	0.153	14	0.064	264	0.013	142	0.017	166	0.030	102	0.031	48	0.019	342	0.021	283
DCP14	.701	0.318	0.278	24	0.122	10	0.058	244	0.020	126	0.010	157	0.026	83	0.029	23	0.016	305	0.021	258
DCP15	.800	0.176	0.213	25	0.086	340	0.064	228	0.025	133	0.017	117	0.027	61	0.020	6	0.014	292	0.018	244
DCP16	.900	-0.031	0.122	23	0.068	295	0.067	224	0.014	157	0.018	116	0.023	58	0.013	11	0.013	268	0.017	227
DCP17	.969	-0.038	0.021	97	0.044	265	0.023	226	0.007	174	0.006	155	0.006	73	0.013	34	0.010	317	0.011	265

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED M2	DRIVE M2	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.06	0.071	0.493	10.26	0.0	7.49	12181.4	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
165.1 (541.6)	72213. (1508.2)	0.79E 07	-0.150	1.558	14.69	-0.90104	1.369	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.494	10.256	0	0.948	357	0.125	337	0.084	56	0.065	348	0.080	338	0.271	212	0.108	113	0.043	54
CN		0.632	0.585	10	0.288	40	0.079	11	0.054	342	0.038	287	0.023	291	0.045	192	0.019	145	0.016	98
CM		-0.029	0.045	230	0.093	121	0.014	56	0.013	78	0.014	3	0.009	353	0.010	325	0.011	262	0.007	291
DCP 1	.010	.053	2.884	345	1.825	68	0.511	93	0.328	55	0.286	353	0.194	1	0.098	310	0.071	242	0.031	253
DCP 2	.020	1.846	2.320	351	1.540	72	0.949	27	0.248	55	0.329	11	0.149	340	0.120	348	0.150	272	0.024	311
DCP 3	.030	1.816	1.985	349	1.308	76	0.569	35	0.247	35	0.314	15	0.206	323	0.070	2	0.196	289	0.063	215
DCP 4	.049	1.804	1.628	0	1.185	60	0.361	26	0.303	29	0.206	352	0.198	343	0.119	273	0.058	270	0.062	267
DCP 5	.074	1.765	1.041	356	0.847	45	0.444	46	0.122	108	0.378	309	0.338	10	0.147	194	0.211	255	0.125	3
DCP 6	.099	1.448	1.134	3	0.784	56	0.211	22	0.183	20	0.190	331	0.093	317	0.094	248	0.071	223	0.046	193
DCP 7	.149	1.159	0.981	8	0.589	45	0.161	7	0.143	357	0.109	304	0.078	285	0.105	225	0.068	195	0.058	175
DCP 8	.200	0.953	0.848	10	0.456	48	0.141	17	0.118	352	0.078	302	0.068	290	0.100	226	0.054	194	0.052	170
DCP 9	.250	0.857	0.791	10	0.381	39	0.123	7	0.112	331	0.081	280	0.078	253	0.093	197	0.062	155	0.061	132
DCP10	.300	0.770	0.698	11	0.315	33	0.098	2	0.095	325	0.063	265	0.050	245	0.079	190	0.049	134	0.038	123
DCP11	.399	0.659	0.617	17	0.259	28	0.052	350	0.069	326	0.051	296	0.034	239	0.067	197	0.047	134	0.033	118
DCP12	.501	0.505	0.516	20	0.203	18	0.031	328	0.054	312	0.043	234	0.025	220	0.057	182	0.044	110	0.027	91
DCP13	.600	0.417	0.420	25	0.173	9	0.026	288	0.044	301	0.040	216	0.022	200	0.049	171	0.042	94	0.025	74
DCP14	.701	0.401	0.308	31	0.145	359	0.030	242	0.036	285	0.043	193	0.020	165	0.039	150	0.037	74	0.027	49
DCP15	.800	0.245	0.262	28	0.113	334	0.033	248	0.045	259	0.048	176	0.019	149	0.035	137	0.038	71	0.031	32
DCP16	.900	0.002	0.176	21	0.086	311	0.037	267	0.041	246	0.032	174	0.022	167	0.029	118	0.028	68	0.027	25
DCP17	.969	-0.034	0.049	28	0.045	300	0.019	287	0.021	258	0.011	194	0.011	200	0.017	139	0.014	83	0.013	26

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED M2	DRIVE M2	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.16	0.054	0.615	9.52	0.0	-0.03	12183.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.AMAX	AERO DAMP	TAB	EXT DAMP
199.2 (653.6)	3910. (2170.2)	0.95E 07	-0.069	1.176	9.77	-0.66099	1.574	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		-0.025	9.531	0	1.052	359	0.066	293	0.059	82	0.059	46	0.022	117	0.132	241	0.043	93	0.053	349
CN		0.184	0.177	1	0.085	6	0.160	274	0.020	205	0.020	104	0.005	7	0.013	166	0.004	198	0.006	32
CM		-0.011	0.091	317	0.045	264	0.015	352	0.011	345	0.006	159	0.003	96	0.004	26	0.001	337	0.001	184
DCP 1	.010	-0.139	3.046	353	0.936	250	0.077	340	0.066	242	0.155	181	0.077	10	0.048	275	0.071	319	0.021	240
DCP 2	.020	0.031	3.006	351	0.865	256	0.062	317	0.067	348	0.086	269	0.110	22	0.035	4	0.058	342	0.038	65
DCP 3	.030	0.058	2.971	355	0.790	276	0.078	344	0.095	26	0.064	171	0.062	27	0.039	46	0.069	338	0.026	59
DCP 4	.049	0.093	2.697	356	0.631	274	0.004	311	0.136	28	0.068	115	0.012	45	0.045	75	0.031	214	0.003	94
DCP 5	.075	0.068	2.084	356	0.453	1	0.384	317	0.154	257	0.153	145	0.040	186	0.039	46	0.013	348	0.036	198
DCP 6	.099	0.056	1.862	359	0.317	9	0.094	318	0.121	208	0.155	144	0.061	101	0.038	339	0.022	78	0.014	340
DCP 7	.150	0.043	1.509	6	0.131	17	0.104	271	0.086	249	0.107	137	0.032	124	0.049	341	0.014	30	0.018	336
DCP 8	.201	0.017	1.249	0	0.139	356	0.157	253	0.089	177	0.081	74	0.033	45	0.069	281	0.023	335	0.016	88
DCP 9	.250	0.000	1.061	7	0.115	1	0.134	227	0.081	164	0.056	49	0.026	349	0.062	261	0.027	301	0.023	61
DCP10	.299	0.175	0.765	9	0.090	24	0.084	238	0.046	179	0.034	20	0.019	315	0.031	248	0.021	177	0.018	55
DCP11	.401	0.169	0.250	7	0.079	34	0.082	247	0.040	142	0.017	26	0.015	289	0.029	230	0.004	161	0.015	32
DCP12	.500	0.167	0.384	15	0.071	46	0.052	254	0.040	179	0.016	16	0.012	286	0.016	219	0.006	131	0.006	348
DCP13	.601	0.195	0.437	18	0.070	53	0.034	253	0.038	178	0.015	336	0.010	256	0.013	183	0.005	94	0.008	350
DCP14	.699	0.189	0.138	30	0.058	57	0.033	218	0.034	168	0.014	318	0.011	272	0.016	192	0.004	126	0.008	335
DCP15	.750	-0.075	0.059	66	0.047	104	0.043	141	0.035	157	0.015	299	0.005	289	0.007	136	0.010	190	0.003	224

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	29.18	0.000	0.805	10.22	0.0	2.45	12103.2	26

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDA	EXT DAMP
198.3 (650.6)	103321. (2157.9)	0.938 07	-0.064	1.272	11.47	-0.00107	1.687	0.0

HARMONIC ANALYSIS

DATA TYPE	A/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.451	10.221 0	0.964 353	0.855 344	0.052 352	0.021 191	0.083 149	0.101 144	0.040 5	0.040 295
CN		0.498	0.848 1	0.170 56	0.094 212	0.051 273	0.027 215	0.017 143	0.011 92	0.007 19	0.010 316
CM		-0.018	0.034 247	0.012 111	0.017 34	0.008 330	0.001 262	0.005 199	0.004 165	0.003 120	0.004 61
DCP 1	.010	0.293	4.008 350	0.008 54	0.792 329	0.347 336	0.078 244	0.012 47	0.166 70	0.020 36	0.009 356
DCP 2	.020	0.387	3.823 353	0.009 56	0.583 339	0.269 342	0.102 209	0.051 140	0.088 94	0.054 96	0.024 8
DCP 3	.030	0.436	3.381 352	0.006 66	0.493 346	0.244 324	0.088 199	0.065 167	0.043 116	0.033 94	0.010 281
DCP 4	.049	0.732	3.014 352	0.002 62	0.330 356	0.227 327	0.082 207	0.132 169	0.020 154	0.027 71	0.010 302
DCP 5	.099	0.812	2.511 353	0.003 61	0.349 348	0.215 280	0.072 282	0.134 190	0.055 163	0.007 445	0.001 43
DCP 6	.199	0.560	1.711 356	0.002 -1	0.206 336	0.200 268	0.041 240	0.070 177	0.008 154	0.013 118	0.003 46
DCP 7	.300	0.407	1.398 2	0.370 35	0.127 322	0.143 267	0.047 218	0.041 151	0.034 141	0.003 67	0.006 8
DCP 8	.350	0.444	1.235 0	0.264 29	0.107 330	0.104 245	0.079 191	0.020 169	0.024 85	0.002 57	0.003 341
DCP 9	.366	0.463	1.023 0	0.242 31	0.081 291	0.077 242	0.054 185	0.033 76	0.024 67	0.015 25	0.007 313
DCP10	.399	0.334	0.789 7	0.157 25	0.083 286	0.045 233	0.030 175	0.024 76	0.019 45	0.013 5	0.001 301
DCP11	.451	0.451	0.569 16	0.115 23	0.071 273	0.021 218	0.010 163	0.015 50	0.009 32	0.009 357	0.017 299
DCP12	.600	0.217	0.404 18	0.069 22	0.067 286	0.014 196	0.003 132	0.008 32	0.011 36	0.010 351	0.013 271
DCP13	.701	0.255	0.242 25	0.076 26	0.055 257	0.011 138	0.009 109	0.008 18	0.013 6	0.007 292	0.012 210
DCP14	.800	0.138	0.101 35	0.035 356	0.056 257	0.011 148	0.001 118	0.009 57	0.012 340	0.012 289	0.009 218
DCP15	.900	-0.048	0.075 57	0.054 284	0.051 228	0.015 262	0.005 169	0.011 24	0.010 340	0.011 282	0.004 221

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	29.17	0.000	0.802	10.22	0.0	4.07	12103.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDA	EXT DAMP
197.4 (647.8)	102808. (2147.2)	0.935 07	-0.051	1.309	12.71	-0.00116	1.744	0.0

HARMONIC ANALYSIS

DATA TYPE	A/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.068	10.219 0	0.963 356	0.845 336	0.089 53	0.042 329	0.110 290	0.174 184	0.081 106	0.030 42
CN		0.852	0.730 1	0.153 42	0.078 305	0.052 333	0.029 279	0.020 225	0.021 261	0.013 169	0.014 140
CM		-0.022	0.034 282	0.023 116	0.015 37	0.003 94	0.008 12	0.008 306	0.004 266	0.004 249	0.004 264
DCP 1	.010	0.326	3.875 348	1.209 57	0.478 353	0.307 339	0.144 40	0.054 150	0.116 280	0.031 171	0.007 174
DCP 2	.020	0.379	3.659 350	1.115 61	0.411 8	0.181 342	0.083 23	0.052 193	0.140 219	0.060 134	0.019 116
DCP 3	.030	0.431	2.921 349	1.054 63	0.371 19	0.113 325	0.089 343	0.060 264	0.113 213	0.029 215	0.004 74
DCP 4	.049	1.153	2.693 349	0.918 65	0.314 45	0.078 332	0.087 313	0.112 316	0.078 292	0.004 224	0.004 189
DCP 5	.099	1.182	1.880 352	0.692 69	0.265 357	0.120 21	0.101 314	0.071 296	0.079 264	0.030 194	0.030 198
DCP 6	.199	0.798	1.340 0	0.501 49	0.251 326	0.122 333	0.129 267	0.087 259	0.050 255	0.053 217	0.039 178
DCP 7	.300	0.722	1.114 5	0.418 45	0.109 336	0.118 331	0.083 301	0.078 255	0.047 215	0.030 218	0.009 160
DCP 8	.350	0.632	1.014 5	0.344 35	0.137 345	0.101 315	0.071 280	0.075 228	0.055 174	0.033 178	0.008 118
DCP 9	.366	0.600	0.986 4	0.333 31	0.095 342	0.086 314	0.066 257	0.058 211	0.050 166	0.035 134	0.006 89
DCP10	.399	0.495	0.703 10	0.226 29	0.054 323	0.050 327	0.051 251	0.038 192	0.029 178	0.020 127	0.009 88
DCP11	.501	0.378	0.540 13	0.175 21	0.037 288	0.030 332	0.035 297	0.042 172	0.016 179	0.021 120	0.008 76
DCP12	.600	0.310	0.418 18	0.140 13	0.030 257	0.028 345	0.030 297	0.023 148	0.016 145	0.020 90	0.010 53
DCP13	.701	0.316	0.283 20	0.100 16	0.033 226	0.022 357	0.024 219	0.021 116	0.004 69	0.015 71	0.015 10
DCP14	.800	0.178	0.207 28	0.078 337	0.040 237	0.017 297	0.016 194	0.011 112	0.009 60	0.015 55	0.011 3
DCP15	.900	-0.033	0.126 29	0.042 295	0.042 251	0.023 285	0.020 181	0.014 118	0.012 87	0.014 49	0.010 8

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.17	0.052	0.700	10.23	0.0	0.01	12169.1	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
228.1 (748.4)	128846. (2691.0)	[illegible]	-0.067	1.263	9.31	-0.461 S	2.262	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		0.017	10.290 6	0.008 355	0.009 349	0.161 29	0.056 269	0.118 224	0.086 291	0.090 1	0.037 328
CN		0.147	0.963 1	0.188 45	0.147 296	0.052 287	0.024 139	0.021 196	0.004 345	0.027 45	0.009 322
CM		-0.021	0.033 263	0.015 195	0.005 8	0.015 17	0.006 311	0.007 265	0.003 77	0.004 144	0.005 108
DCP 1	.010	-0.503	3.354 352	0.455 355	0.701 348	0.145 332	0.120 306	0.027 248	0.087 276	0.045 13	0.056 403
DCP 2	.020	-0.494	3.316 355	0.356 277	0.647 347	0.152 1	0.105 331	0.020 218	0.072 296	0.062 7	0.029 218
DCP 3	.050	-0.513	3.095 355	0.224 287	0.530 346	0.121 26	0.118 308	0.043 341	0.064 331	0.074 8	0.002 286
DCP 4	.099	-0.467	2.852 354	0.041 327	0.321 333	0.197 19	0.087 342	0.075 51	0.052 341	0.060 17	0.036 95
DCP 5	.099	[illegible]	2.695 356	[illegible] 0	0.403 345	0.114 8	0.036 51	0.054 350	0.081 26	0.090 44	0.049 73
DCP 6	.149	0.308	2.110 355	0.240 92	0.426 313	0.167 332	0.063 137	0.073 208	0.072 26	0.074 184	0.019 19
DCP 7	.201	0.291	1.748 356	0.304 97	0.340 310	0.153 291	0.141 158	0.177 230	0.047 64	0.062 136	0.035 286
DCP 8	.251	0.269	1.491 356	0.259 76	0.287 318	0.187 284	0.138 136	0.191 209	0.070 177	0.041 122	0.032 78
DCP 9	.300	0.237	1.268 4	0.196 46	0.180 304	0.178 277	0.074 172	0.128 193	0.064 158	0.074 76	0.035 89
DCP10	.349	0.269	0.989 8	0.210 49	0.078 271	0.102 283	0.059 142	0.039 182	0.038 222	0.071 50	0.011 286
DCP11	.401	0.240	0.749 9	0.114 47	0.083 245	0.078 252	0.034 142	0.038 115	0.018 227	0.055 31	0.026 328
DCP12	.500	0.135	0.545 15	0.114 22	0.096 236	0.081 219	0.024 141	0.042 67	0.007 4	0.043 6	0.037 311
DCP13	.701	0.060	0.347 25	0.100 29	0.101 223	0.046 182	0.011 113	0.037 77	0.017 [illegible]	0.027 344	0.032 294
DCP14	.800	0.045	0.227 33	0.097 356	0.096 211	0.046 164	0.014 86	0.0[illegible] 42	0.019 343	0.021 288	0.018 [illegible]
DCP15	.900	-0.001	0.096 46	0.091 296	0.086 204	0.051 177	0.020 114	0.026 45	0.019 291	0.027 262	0.014 298

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.21	0.052	0.700	10.23	0.[illegible]	2.42	12185.2	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
227.1 (745.1)	127936. (2672.0)	0.10[illegible] 08	-0.108	1.308	10.73	-0.03129	2.324	0.[illegible]

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		2.413	10.232 0	0.934 358	0.170 342	0.126 53	0.086 359	0.036 214	0.127 285	0.048 108	0.004 92
CN		0.273	0.924 0	0.244 44	0.066 315	0.071 297	0.037 249	0.012 176	0.018 282	0.013 146	0.011 57
CM		-0.031	0.038 268	0.027 115	0.012 42	0.019 56	0.011 18	0.002 241	0.003 314	0.005 235	0.005 218
DCP 1	.010	-0.05[illegible]	3.990 350	0.443 32	0.494 323	0.256 349	0.069 [illegible]67	0.112 344	0.076 84	0.025 1	0.004 28
DCP 2	.020	0.010	3.331 353	0.444 36	0.351 325	0.252 357	0.026 283	0.079 0	0.090 95	0.043 82	0.038 44
DCP 3	.050	[illegible]	3.126 352	0.515 40	0.273 325	0.239 2	0.063 144	0.037 24	0.092 92	0.049 97	0.029 91
DCP 4	.049	0.35[illegible]	2.969 332	0.424 43	0.155 317	0.192 21	0.101 120	0.019 28	0.084 86	0.053 135	0.005 202
DCP 5	.099	0.587	2.467 351	0.727 58	0.129 353	0.185 349	0.067 129	0.089 159	0.035 136	0.051 142	0.036 219
DCP 6	.149	0.527	1.996 351	0.777 67	0.147 347	0.156 307	0.068 313	0.088 178	0.097 242	0.016 249	0.052 213
DCP 7	.201	0.493	1.985 357	0.716 71	0.142 313	0.171 300	0.234 329	0.100 164	0.138 266	0.046 272	0.022 43
DCP 8	.250	0.439	1.291 359	0.502 55	0.172 338	0.112 284	0.182 292	0.060 206	0.106 265	0.073 197	0.013 13
DCP 9	.300	0.391	1.124 2	0.384 43	0.129 358	0.140 278	0.128 282	0.065 243	0.065 226	0.066 211	0.034 99
DCP10	.349	0.324	0.884 7	0.244 33	0.028 11	0.099 266	0.06[illegible] 251	0.028 [illegible]70	0.034 171	0.042 214	0.034 78
DCP11	.501	0.281	0.673 12	0.172 19	0.037 303	0.074 271	0.071 223	0.016 288	0.432 151	0.027 121	0.024 79
DCP12	.600	0.261	0.505 17	0.136 0	0.056 278	0.059 273	0.068 209	0.009 189	0.028 152	0.041 98	0.032 97
DCP13	.701	0.303	0.320 27	0.102 344	0.062 239	0.038 269	0.052 194	0.017 86	0.018 120	0.039 62	0.025 27
DCP14	.800	0.159	0.221 28	0.075 341	0.06[illegible] 232	0.038 250	0.045 169	0.029 73	0.010 75	0.030 39	0.018 337
DCP15	.900	-0.038	0.111 35	0.083 273	0.061 238	0.041 240	0.034 167	0.016 94	0.009 79	0.027 32	0.019 357

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL-ALPHA	DEL-M	ALPHA-0	TEST POINT	CYCLES ANALYSED
C.0	23.20	0.052	0.698	10.17	0.0	4.97	12185.3	20

	Q	RN	CM(MIN)	CN(MAX)	ALPHA-MAX	AERO DAMP	TDR	EXT DAMP
226.0 (741.6)	127256. (2657.8)	0.10E 08	-0.134	1.376	11.69	-0.00142	2.562	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		4.97C	10.171 0	0.915 4	0.105 343	0.595 70	0.066 87	0.066 7	0.056 337	0.070 197	0.037 171
CN		0.451	0.787 1	0.330 41	0.076 14	0.063 353	0.341 285	0.323 279	0.006 261	0.014 236	0.011 166
CM		0.037	0.048 242	0.029 109	0.008 11	0.015 104	0.008 65	0.007 17	0.003 334	0.004 353	0.004 308
PCP	.01C	0.472	3.247 347	0.965 90	0.340 4	0.357 1	0.110 67	0.027 303	0.053 59	0.081 131	0.027 103
PCP 2	.02C	0.492	2.991 350	0.882 51	0.289 25	0.274 1	0.108 89	0.018 244	0.020 157	0.072 161	0.057 184
PCP 3	.04C	0.537	2.686 349	0.916 52	0.269 38	0.218 353	0.085 85	0.072 212	0.059 178	0.053 162	0.072 193
PCP 4	.06C	0.481	2.607 350	0.825 45	0.208 74	0.157 359	0.056 110	0.090 178	0.074 184	0.023 156	0.017 167
PCP 5	.08C	0.468	1.681 348	0.908 53	0.277 74	0.059 36	0.044 278	0.027 247	0.064 183	0.098 255	0.038 330
PCP 6	.10C	0.850	1.503 348	0.952 53	0.163 50	0.144 100	0.102 275	0.129 318	0.057 14	0.086 258	0.047 353
PCP 7	.20C	0.755	1.113 355	0.781 57	0.112 32	0.186 61	0.159 276	0.194 342	0.092 3	0.073 26	0.052 156
PCP 8	.25C	0.706	0.950 0	0.551 52	0.138 0	0.195 30	0.118 298	0.136 340	0.058 306	0.081 347	0.039 167
PCP 9	.30C	0.641	0.838 6	0.369 47	0.169 359	0.137 12	0.125 325	0.058 337	0.079 305	0.041 311	0.039 245
PCP10	.40C	0.528	0.739 11	0.213 38	0.134 3	0.074 342	0.065 335	0.023 222	0.022 293	0.021 201	0.020 288
PCP11	.50C	0.425	0.630 15	0.178 22	0.078 2	0.082 319	0.044 300	0.035 230	0.018 230	0.031 210	0.015 182
PCP12	.60C	0.367	0.527 15	0.153 5	0.055 4	0.084 308	0.042 264	0.043 229	0.022 193	0.033 206	0.019 160
PCP13	.70C	0.377	0.364 25	0.128 344	0.010 44	0.069 302	0.039 233	0.037 204	0.021 149	0.024 196	0.030 136
PCP14	.80C	0.215	0.295 22	0.117 313	0.009 249	0.058 282	0.044 213	0.032 186	0.023 127	0.015 146	0.023 108
PCP15	.90C	-0.025	0.182 15	0.097 302	0.033 294	0.053 270	0.043 222	0.031 183	0.020 130	0.016 139	0.018 92

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.70	0.291	0.234	5.25	0.0	13.89	12087.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
81.0 (264.2)	16447. (343.5)	0.37E 07	-0.108	1.339	19.15	0.00006	-0.038	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		13.887	5.246	0	0.306	359	0.036	144	0.087	263	0.052	45	0.014	353	0.029	136	0.024	204	0.017	70
CN		1.045	0.377	17	0.080	146	0.036	2	0.009	267	0.014	59	0.005	304	0.009	68	0.008	197	0.006	72
CM		-0.023	0.017	162	0.039	281	0.020	142	0.009	280	0.007	163	0.004	84	0.004	208	0.002	91	0.002	291
DCP 1	.010	4.060	1.485	49	0.706	326	0.287	231	0.180	219	0.154	98	0.023	100	0.084	212	0.086	183	0.022	130
DCP 2	.020	3.800	1.340	38	0.507	310	0.190	212	0.060	257	0.081	60	0.017	343	0.046	146	0.084	187	0.051	94
DCP 3	.030	3.733	1.364	25	0.451	282	0.271	157	0.132	335	0.053	274	0.112	168	0.109	45	0.097	235	0.033	148
DCP 4	.049	3.106	0.943	38	0.262	320	0.155	178	0.066	312	0.076	146	0.032	79	0.016	9	0.045	292	0.011	165
DCP 5	.074	2.673	0.851	30	0.253	282	0.149	140	0.068	321	0.031	105	0.030	53	0.008	107	0.055	175	0.023	59
DCP 6	.099	2.502	0.789	25	0.257	255	0.141	125	0.114	308	0.038	29	0.018	334	0.018	121	0.052	138	0.027	2
DCP 7	.149	2.015	0.690	13	0.272	216	0.150	78	0.092	290	0.028	340	0.017	126	0.018	237	0.021	77	0.013	248
DCP 8	.200	1.768	0.632	2	0.298	198	0.132	74	0.082	269	0.051	254	0.018	156	0.016	51	0.005	276	0.022	81
DCP 9	.250	1.392	0.609	7	0.233	163	0.098	40	0.035	294	0.083	183	0.051	94	0.021	5	0.029	212	0.013	74
DCP10	.300	1.187	0.499	6	0.206	148	0.097	17	0.045	240	0.081	124	0.032	13	0.021	202	0.022	131	0.029	25
DCP11	.399	0.983	0.415	13	0.203	141	0.100	8	0.036	210	0.060	111	0.031	4	0.033	184	0.023	61	0.011	14
DCP12	.501	0.767	0.325	16	0.188	125	0.099	340	0.031	184	0.050	66	0.035	300	0.022	104	0.014	338	0.021	284
DCP13	.600	0.665	0.257	19	0.170	115	0.086	333	0.039	116	0.046	31	0.038	287	0.041	77	0.009	351	0.010	188
DCP14	.701	0.511	0.172	21	0.143	96	0.093	303	0.032	112	0.048	345	0.027	226	0.034	38	0.017	260	0.021	150
DCP15	.800	0.323	0.092	6	0.133	85	0.081	305	0.039	85	0.053	319	0.017	229	0.032	7	0.019	275	0.016	101
DCP16	.900	0.088	0.055	335	0.086	71	0.038	274	0.042	53	0.028	298	0.015	173	0.011	262	0.023	192	0.016	94
DCP17	.969	0.020	0.040	337	0.042	54	0.029	25	0.024	75	0.024	303	0.007	8	0.023	322	0.016	192	0.014	21

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.11	0.293	0.198	5.38	0.0	15.01	12087.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.0 (223.0)	11893. (248.4)	0.32E 07	-0.272	1.935	19.88	0.00215	-1.231	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.005	5.384	0	0.276	352	0.023	243	0.072	293	0.047	29	0.017	79	0.025	192	0.003	266	0.001	181
CN		1.261	0.456	14	0.161	185	0.090	36	0.027	266	0.007	258	0.026	276	0.016	129	0.015	351	0.016	166
CM		-0.052	0.069	129	0.072	317	0.038	167	0.014	17	0.005	218	0.010	109	0.005	297	0.006	177	0.006	346
DCP 1	.010	4.273	2.364	67	0.727	4	0.320	5	0.428	269	0.216	225	0.141	168	0.062	135	0.089	38	0.067	320
DCP 2	.020	4.186	2.119	52	0.572	342	0.178	23	0.252	271	0.170	191	0.138	121	0.067	7	0.040	291	0.006	212
DCP 3	.030	4.133	2.152	45	0.778	317	0.190	182	0.088	138	0.127	25	0.137	248	0.071	162	0.056	88	0.078	6
DCP 4	.049	3.409	1.734	44	0.583	324	0.149	180	0.035	301	0.092	176	0.027	35	0.006	240	0.038	284	0.044	131
DCP 5	.074	2.963	1.594	37	0.527	296	0.187	153	0.007	272	0.055	111	0.053	319	0.010	128	0.046	271	0.050	139
DCP 6	.099	2.811	1.469	33	0.453	279	0.158	138	0.033	148	0.071	63	0.073	298	0.044	184	0.024	256	0.039	135
DCP 7	.149	2.232	1.288	24	0.368	250	0.144	132	0.084	91	0.087	2	0.067	263	0.037	158	0.017	164	0.043	50
DCP 8	.200	1.993	1.183	19	0.375	243	0.168	143	0.098	71	0.086	341	0.068	260	0.056	159	0.008	186	0.009	325
DCP 9	.250	1.762	1.046	8	0.374	211	0.198	101	0.152	9	0.103	283	0.079	208	0.050	101	0.030	3	0.034	298
DCP10	.300	1.565	0.928	2	0.405	192	0.232	71	0.156	335	0.115	242	0.081	154	0.046	38	0.024	347	0.016	216
DCP11	.399	1.302	0.771	2	0.386	181	0.217	58	0.134	321	0.125	227	0.068	100	0.036	334	0.005	289	0.036	194
DCP12	.501	1.017	0.610	358	0.348	166	0.213	33	0.122	277	0.075	174	0.062	18	0.021	262	0.016	257	0.033	156
DCP13	.600	0.887	0.479	354	0.345	152	0.215	15	0.127	243	0.084	113	0.100	326	0.030	188	0.027	87	0.015	260
DCP14	.701	0.669	0.344	345	0.306	132	0.203	340	0.115	191	0.059	49	0.076	287	0.043	149	0.048	35	0.044	205
DCP15	.800	0.441	0.245	323	0.262	119	0.176	323	0.107	153	0.056	8	0.070	252	0.036	116	0.042	337	0.042	151
DCP16	.900	0.127	0.160	314	0.142	105	0.113	307	0.059	149	0.041	356	0.039	208	0.029	103	0.033	345	0.043	110
DCP17	.969	0.051	0.072	321	0.029	107	0.041	307	0.026	161	0.045	5	0.034	234	0.031	66	0.033	310	0.005	217

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.15	0.297	0.197	5.39	0.0	16.08	12087.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.2 (220.5)	11707. (244.5)	0.32E 07	-0.310	1.875	20.75	0.00253	-1.437	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		16.079	5.389	0	0.298	351	0.026	236	0.073	299	0.045	48	0.013	52	0.028	197	0.007	257	0.024	178
CN		1.275	0.651	18	0.120	191	0.072	29	0.035	278	0.029	167	0.037	316	0.015	141	0.032	319	0.021	105
CM		-0.058	0.080	127	0.077	316	0.041	174	0.014	44	0.009	272	0.017	103	0.010	293	0.013	140	0.008	246
DCP 1	.010	4.197	2.030	77	0.751	20	0.451	30	0.434	305	0.330	271	0.138	258	0.089	239	0.105	88	0.095	152
DCP 2	.020	4.105	2.080	66	0.563	356	0.263	56	0.264	321	0.246	269	0.164	203	0.122	153	0.077	61	0.050	99
DCP 3	.030	4.046	2.218	56	0.825	334	0.175	252	0.215	193	0.126	93	0.084	340	0.114	285	0.105	213	0.092	122
DCP 4	.049	3.356	1.953	57	0.779	330	0.210	229	0.114	174	0.049	184	0.055	70	0.036	233	0.056	34	0.012	316
DCP 5	.074	2.977	1.737	48	0.655	311	0.198	207	0.102	157	0.027	153	0.075	19	0.047	251	0.054	351	0.040	246
DCP 6	.099	2.800	1.555	43	0.556	300	0.186	199	0.080	154	0.050	133	0.128	18	0.063	274	0.050	302	0.043	219
DCP 7	.149	2.251	1.367	31	0.465	281	0.196	187	0.066	106	0.086	128	0.136	351	0.055	241	0.047	281	0.049	140
DCP 8	.200	1.978	1.277	27	0.450	269	0.228	178	0.084	97	0.068	91	0.105	349	0.060	225	0.042	198	0.075	144
DCP 9	.250	1.785	1.085	9	0.412	215	0.221	102	0.155	15	0.097	306	0.096	226	0.084	102	0.023	11	0.057	273
DCP10	.300	1.600	0.963	1	0.417	198	0.243	84	0.212	335	0.124	238	0.097	143	0.085	49	0.081	309	0.046	172
DCP11	.399	1.315	0.792	2	0.358	187	0.223	68	0.191	337	0.156	214	0.094	89	0.035	350	0.022	247	0.046	75
DCP12	.501	1.038	0.606	356	0.339	168	0.213	41	0.113	292	0.133	184	0.076	13	0.047	271	0.030	186	0.048	80
DCP13	.600	0.897	0.448	352	0.336	151	0.228	9	0.130	251	0.114	125	0.121	317	0.029	197	0.042	55	0.015	31
DCP14	.701	0.694	0.357	345	0.329	130	0.226	343	0.153	204	0.073	58	0.104	276	0.094	138	0.097	355	0.032	137
DCP15	.800	0.472	0.281	320	0.310	120	0.211	330	0.092	159	0.051	47	0.075	255	0.063	140	0.077	328	0.035	92
DCP16	.900	0.157	0.162	311	0.192	91	0.120	306	0.051	177	0.049	11	0.092	293	0.059	90	0.075	295	0.055	36
DCP17	.969	0.042	0.033	318	0.011	330	0.050	344	0.020	254	0.067	82	0.071	256	0.050	46	0.076	278	0.058	134

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.72	0.278	0.210	6.17	0.0	13.19	12169.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
72.7 (238.6)	13818. (288.6)	0.35E 07	-0.256	2.436	19.38	0.00113	-0.692	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALP A		13.190	6.169	0	0.603	2	0.116	300	0.058	354	0.018	107	0.015	192	0.028	271	0.027	320	0.022	224
CN		1.396	0.697	31	0.254	267	0.099	172	0.029	10	0.044	348	0.048	16	0.016	294	0.016	128	0.021	131
CM		-0.039	0.073	153	0.074	0	0.043	262	0.020	139	0.013	25	0.010	316	0.002	69	0.002	228	0.007	121
DCP 1	.010	4.124	2.294	77	1.376	2	0.404	313	0.383	271	0.202	171	0.090	73	0.038	285	0.135	268	0.115	182
DCP 2	.020	3.861	2.130	67	1.249	357	0.303	312	0.296	280	0.146	156	0.108	105	0.061	9	0.117	323	0.063	266
DCP 3	.030	3.764	2.100	65	1.361	346	0.307	275	0.239	275	0.193	172	0.077	121	0.084	81	0.161	345	0.119	317
DCP 4	.049	3.836	1.837	49	1.146	336	0.361	237	0.096	98	0.084	89	0.040	9	0.059	295	0.099	282	0.037	141
DCP 5	.074	4.782	1.594	82	0.968	235	1.388	224	1.197	260	1.376	326	1.350	16	0.660	71	0.516	89	0.818	127
DCP 6	.099	3.532	1.573	41	0.874	314	0.219	240	0.159	115	0.142	84	0.079	334	0.105	273	0.091	263	0.083	238
DCP 7	.149	2.970	1.445	37	0.785	296	0.181	222	0.246	96	0.157	65	0.106	322	0.155	275	0.065	234	0.043	206
DCP 8	.200	2.631	1.347	39	0.697	292	0.234	230	0.243	94	0.179	87	0.061	308	0.113	280	0.041	243	0.049	165
DCP 9	.250	1.680	1.036	22	0.448	286	0.224	197	0.221	127	0.133	45	0.131	9	0.111	308	0.096	217	0.077	162
DCP10	.300	1.455	0.903	19	0.385	273	0.234	179	0.197	96	0.126	21	0.120	341	0.119	292	0.115	158	0.071	80
DCP11	.399	1.231	0.823	22	0.381	260	0.249	172	0.228	83	0.164	2	0.101	287	0.086	225	0.122	133	0.077	74
DCP12	.501	1.017	0.652	16	0.336	237	0.237	135	0.207	35	0.131	311	0.104	215	0.058	135	0.068	63	0.065	341
DCP13	.600	0.897	0.520	10	0.318	210	0.208	101	0.180	347	0.111	268	0.113	156	0.050	73	0.047	11	0.064	291
DCP14	.701	0.726	0.380	1	0.326	184	0.202	73	0.164	303	0.101	210	0.119	98	0.041	17	0.045	298	0.036	240
DCP15	.800	0.453	0.265	353	0.230	178	0.111	62	0.143	291	0.075	193	0.110	78	0.063	344	0.014	233	0.018	74
DCP16	.900	0.127	0.145	0	0.147	158	0.078	65	0.102	266	0.045	156	0.031	39	0.013	249	0.015	190	0.013	164
DCP17	.969	0.121	0.150	322	0.178	161	0.113	45	0.147	233	0.084	133	0.085	320	0.075	201	0.061	35	0.055	245

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

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FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	39.70	0.280	0.209	8.10	0.0	14.84	12169.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
72.1 (236.6)	13478. (281.5)	0.34E 07	-0.345	2.378	23.16	0.00100	-0.609	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.840	8.101	0	0.747	354	0.127	288	0.060	358	0.027	88	0.012	109	0.010	207	0.019	217	0.021	146
CN		1.246	0.909	29	0.204	266	0.112	157	0.020	356	0.010	20	0.046	35	0.018	52	0.009	95	0.025	95
CM		-0.070	0.112	162	0.094	7	0.052	253	0.016	163	0.011	3	0.006	23	0.003	274	0.005	65	0.004	234
DCP 1	.010	3.817	2.297	77	1.483	22	0.286	13	0.434	297	0.138	213	0.066	190	0.046	119	0.076	275	0.019	261
DCP 2	.020	3.413	2.280	69	1.348	18	0.266	347	0.328	301	0.098	206	0.068	168	0.101	136	0.075	82	0.133	31
DCP 3	.030	3.295	2.126	66	1.309	15	0.338	332	0.383	293	0.190	215	0.131	174	0.172	134	0.127	74	0.125	45
DCP 4	.049	3.184	1.996	48	1.084	0	0.424	266	0.163	199	0.126	125	0.155	70	0.079	1	0.028	321	0.035	326
DCP 5	.074	3.454	1.925	78	0.404	272	1.126	230	1.072	254	0.918	326	1.013	26	0.991	59	0.435	77	0.576	127
DCP 6	.099	2.665	1.738	40	0.728	334	0.299	241	0.177	182	0.188	111	0.152	52	0.082	3	0.078	315	0.081	245
DCP 7	.149	2.143	1.6..	35	0.659	311	0.303	222	0.216	153	0.189	87	0.139	38	0.087	329	0.056	281	0.071	216
DCP 8	.200	1.878	1.568	34	0.629	307	0.334	215	0.197	140	0.149	100	0.138	41	0.080	328	0.058	299	0.029	234
DCP 9	.250	1.689	1.411	28	0.550	289	0.327	188	0.187	104	0.109	61	0.113	6	0.102	264	0.069	178	0.078	112
DCP10	.300	1.493	1.250	27	0.478	279	0.335	178	0.204	85	0.113	29	0.093	316	0.085	221	0.079	134	0.064	54
DCP11	.399	1.271	1.130	25	0.436	263	0.335	166	0.240	73	0.124	359	0.082	271	0.064	196	0.065	113	0.052	39
DCP12	.501	1.073	0.962	17	0.425	234	0.324	130	0.228	34	0.135	292	0.073	192	0.047	126	0.050	51	0.028	12
DCP13	.600	0.937	0.780	9	0.425	207	0.295	101	0.189	356	0.124	242	0.101	143	0.065	64	0.040	333	0.011	96
DCP14	.701	0.746	0.559	4	0.380	183	0.262	73	0.165	318	0.114	194	0.074	82	0.038	14	0.043	241	0.018	81
DCP15	.800	0.458	0.383	2	0.285	175	0.179	63	0.126	298	0.119	179	0.086	52	0.033	284	0.028	152	0.040	345
DCP16	.900	0.175	0.285	338	0.220	155	0.148	11	0.099	217	0.057	96	0.029	273	0.051	60	0.049	227	0.038	91
DCP17	.969	0.151	0.279	322	0.231	156	0.204	18	0.174	219	0.119	78	0.110	280	0.062	108	0.065	317	0.082	152

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	39.70	0.286	0.209	8.19	0.0	16.06	12169.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
70.7 (231.9)	13033. (272.2)	0.34E 07	-0.383	2.501	24.50	0.00128	-0.765	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		16.063	8.188	0	0.783	356	0.149	291	0.077	35	0.041	103	0.027	107	0.017	222	0.015	223	0.026	174
CN		1.317	0.912	33	0.205	287	0.120	178	0.014	83	0.021	16	0.036	38	0.029	86	0.009	328	0.024	136
CM		-0.081	0.141	163	0.099	17	0.056	272	0.020	204	0.002	324	0.015	57	0.007	321	0.006	136	0.006	31
DCP 1	.010	3.911	2.525	92	1.426	31	0.459	34	0.435	310	0.176	306	0.152	222	0.044	178	0.025	90	0.123	350
DCP 2	.020	3.487	2.383	82	1.327	28	0.405	19	0.324	317	0.120	315	0.133	218	0.097	19.	0.126	156	0.116	94
DCP 3	.030	3.408	2.146	78	1.330	27	0.395	3	0.401	316	0.150	276	0.129	239	0.152	199	0.133	178	0.161	130
DCP 4	.049	3.294	1.847	60	1.179	16	0.409	299	0.229	272	0.197	192	0.188	127	0.084	92	0.058	40	0.073	1
DCP 5	.074	3.799	2.054	97	0.363	288	0.977	237	1.370	254	1.211	316	1.235	34	0.754	87	0.358	78	0.625	105
DCP 6	.099	2.772	1.693	49	0.620	352	0.347	271	0.220	223	0.226	150	0.137	95	0.073	91	0.091	30	0.090	331
DCP 7	.149	2.224	1.628	43	0.704	332	0.350	256	0.223	185	0.175	130	0.139	88	0.101	40	0.070	333	0.052	293
DCP 8	.200	1.929	1.553	43	0.698	331	0.421	244	0.189	180	0.203	138	0.176	85	0.096	22	0.079	324	0.053	315
DCP 9	.250	1.727	1.469	35	0.640	310	0.444	217	0.272	138	0.218	102	0.168	44	0.122	347	0.113	298	0.106	219
DCP10	.300	1.566	1.297	31	0.545	300	0.404	206	0.281	120	0.195	71	0.150	5	0.101	299	0.096	247	0.099	165
DCP11	.399	1.356	1.202	29	0.500	285	0.433	191	0.310	103	0.181	46	0.138	329	0.085	269	0.094	206	0.079	145
DCP12	.501	1.155	1.049	19	0.452	252	0.405	157	0.302	64	0.164	343	0.118	257	0.076	194	0.073	134	0.048	69
DCP13	.600	0.998	0.874	10	0.444	219	0.369	122	0.260	30	0.173	300	0.127	207	0.069	132	0.056	68	0.026	10
DCP14	.701	0.792	0.647	3	0.421	196	0.313	95	0.222	351	0.153	241	0.099	147	0.039	71	0.031	339	0.011	313
DCP15	.800	0.498	0.433	354	0.305	180	0.216	73	0.132	330	0.134	218	0.097	113	0.058	17	0.048	236	0.035	68
DCP16	.900	0.232	0.373	334	0.280	159	0.235	25	0.159	230	0.108	86	0.076	271	0.098	104	0.100	317	0.089	197
DCP17	.969	0.180	0.308	321	0.256	162	0.259	23	0.213	241	0.183	97	0.157	304	0.127	166	0.103	31	0.080	242

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.67	0.287	0.204	10.66	0.0	13.97	12173.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
70.5 (231.2)	12727. (265.8)	0.33E 07	-0.397	2.417	24.85	0.00068	-0.401	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		13.972	10.662	0	1.207	354	0.230	319	0.072	0	0.067	152	0.055	137	0.023	114	0.020	272	0.010	194
CN		1.179	1.059	26	0.176	282	0.098	139	0.042	50	0.037	82	0.008	92	0.018	109	0.028	314	0.021	141
CM		-0.098	0.122	165	0.116	4	0.055	252	0.017	153	0.006	319	0.009	12	0.011	270	0.016	123	0.012	335
DCP 1	.010	3.211	2.274	60	1.842	27	0.376	6	0.422	303	0.130	245	0.037	170	0.089	133	0.030	38	0.044	270
DCP 2	.020	2.975	2.429	54	1.628	23	0.372	352	0.429	300	0.140	242	0.120	186	0.172	134	0.162	77	0.131	23
DCP 3	.030	2.906	2.211	53	1.458	21	0.391	345	0.427	297	0.167	233	0.103	193	0.163	150	0.145	90	0.114	52
DCP 4	.049	2.675	2.143	46	1.217	10	0.281	305	0.259	274	0.137	179	0.092	117	0.070	111	0.066	65	0.063	28
DCP 5	.074	2.407	2.027	42	1.019	356	0.276	277	0.206	239	0.155	146	0.115	101	0.091	72	0.073	32	0.079	336
DCP 6	.099	2.375	1.940	39	0.875	347	0.270	264	0.213	218	0.171	129	0.135	88	0.097	51	0.078	5	0.077	296
DCP 7	.149	1.937	1.812	36	0.764	330	0.239	242	0.260	180	0.231	102	0.162	53	0.113	344	0.069	296	0.092	245
DCP 8	.200	1.740	1.727	36	0.704	324	0.380	232	0.282	166	0.226	101	0.196	46	0.124	328	0.082	281	0.067	229
DCP 9	.250	1.585	1.631	29	0.650	300	0.422	202	0.351	118	0.274	60	0.216	354	0.174	272	0.115	224	0.114	144
DCP10	.300	1.496	1.486	25	0.566	287	0.430	186	0.353	99	0.263	36	0.212	321	0.147	230	0.094	176	0.092	102
DCP11	.399	1.271	1.347	25	0.512	266	0.465	166	0.396	76	0.237	359	0.174	266	0.136	179	0.065	95	0.056	77
DCP12	.501	1.069	1.124	18	0.470	234	0.429	131	0.371	35	0.196	300	0.165	200	0.125	118	0.099	17	0.028	313
DCP13	.600	0.977	0.906	11	0.473	204	0.388	99	0.298	358	0.173	242	0.156	146	0.100	62	0.086	324	0.033	229
DCP14	.701	0.792	0.658	4	0.453	181	0.319	67	0.222	318	0.173	192	0.138	101	0.057	354	0.056	263	0.030	122
DCP15	.800	0.499	0.420	1	0.322	166	0.208	50	0.160	294	0.162	170	0.130	69	0.056	293	0.034	194	0.026	21
DCP16	.900	0.273	0.351	333	0.327	145	0.225	2	0.184	210	0.137	69	0.082	244	0.102	72	0.121	288	0.122	144
DCP17	.969	0.227	0.349	317	0.326	152	0.323	2	0.275	212	0.234	73	0.181	270	0.166	119	0.165	331	0.139	187

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.69	0.294	0.200	10.63	0.0	14.97	12173.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
68.8 (225.7)	12281. (256.5)	0.33E 07	-0.380	2.562	25.84	0.00076	-0.441	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		14.973	10.633	0	1.202	355	0.257	318	0.044	21	0.066	157	0.047	140	0.025	105	0.008	285	0.011	132
CN		1.242	1.079	29	0.183	303	0.079	171	0.036	99	0.041	73	0.013	1	0.027	136	0.017	351	0.038	213
CM		-0.100	0.137	166	0.113	8	0.049	262	0.011	176	0.010	206	0.012	75	0.015	304	0.010	143	0.009	23
DCP 1	.010	3.386	2.206	72	1.825	33	0.503	31	0.464	322	0.141	279	0.113	251	0.105	181	0.061	194	0.056	92
DCP 2	.020	3.092	2.338	65	1.649	31	0.472	14	0.442	318	0.150	281	0.128	241	0.143	185	0.134	155	0.173	96
DCP 3	.030	3.045	2.137	62	1.512	29	0.469	7	0.472	318	0.225	265	0.139	237	0.171	192	0.136	156	0.167	113
DCP 4	.049	2.819	2.068	53	1.319	19	0.352	327	0.309	293	0.211	215	0.130	148	0.068	116	0.068	100	0.079	49
DCP 5	.074	2.568	1.993	48	1.092	5	0.321	299	0.253	255	0.198	186	0.156	125	0.095	86	0.088	64	0.090	11
DCP 6	.099	2.519	1.946	45	0.938	355	0.313	285	0.238	231	0.202	162	0.163	111	0.117	82	0.112	43	0.103	343
DCP 7	.149	2.049	1.866	39	0.833	338	0.389	258	0.296	194	0.221	137	0.196	84	0.128	36	0.106	352	0.095	287
DCP 8	.200	1.841	1.790	40	0.809	333	0.462	252	0.320	184	0.251	136	0.237	79	0.129	14	0.106	334	0.063	276
DCP 9	.250	1.661	1.697	32	0.715	315	0.483	222	0.352	146	0.300	91	0.282	26	0.149	312	0.093	272	0.083	200
DCP10	.300	1.520	1.530	29	0.601	300	0.452	205	0.352	124	0.289	60	0.231	346	0.140	281	0.079	216	0.067	147
DCP11	.399	1.375	1.429	26	0.542	280	0.501	189	0.411	102	0.312	29	0.212	308	0.158	218	0.077	152	0.056	97
DCP12	.501	1.138	1.201	19	0.480	246	0.444	149	0.370	56	0.226	330	0.150	236	0.125	161	0.078	88	0.056	4
DCP13	.600	1.012	0.949	14	0.435	210	0.385	114	0.293	14	0.179	274	0.133	177	0.080	111	0.059	23	0.050	281
DCP14	.701	0.795	0.674	8	0.421	184	0.280	82	0.228	341	0.166	225	0.108	110	0.047	47	0.030	340	0.042	265
DCP15	.800	0.497	0.427	2	0.302	169	0.197	63	0.148	317	0.126	190	0.083	77	0.023	344	0.019	214	0.009	221
DCP16	.900	0.298	0.433	328	0.374	148	0.309	8	0.227	216	0.167	54	0.127	247	0.118	87	0.133	289	0.095	152
DCP17	.969	0.241	0.400	318	0.346	153	0.348	8	0.307	228	0.243	81	0.195	292	0.197	143	0.144	358	0.111	216

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	39.68	0.298	0.197	10.67	0.0	15.94	12173.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
67.8 (222.6)	11994. (250.5)	0.32E 07	-0.404	2.680	26.81	0.00080	-0.459	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.936	10.666	0	1.216	356	0.270	321	0.046	27	0.075	168	0.051	140	0.027	99	0.019	314	0.014	191
CN		1.294	1.096	31	0.195	318	0.079	190	0.036	138	0.043	96	0.018	335	0.023	140	0.025	6	0.018	186
CM		-0.106	0.152	168	0.112	15	0.047	280	0.006	250	0.015	222	0.020	108	0.017	314	0.016	168	0.010	25
DCP 1	.010	3.521	2.221	83	1.833	40	0.653	42	0.506	332	0.166	312	0.149	271	0.124	236	0.107	186	0.054	158
DCP 2	.020	3.183	2.277	74	1.644	39	0.604	31	0.484	333	0.191	303	0.128	257	0.118	235	0.177	180	0.159	141
DCP 3	.030	3.129	2.071	71	1.521	36	0.536	27	0.516	336	0.234	295	0.170	271	0.188	232	0.183	193	0.181	155
DCP 4	.049	2.917	2.070	60	1.342	24	0.379	349	0.375	310	0.233	245	0.149	192	0.120	174	0.135	125	0.098	92
DCP 5	.074	2.649	2.005	55	1.134	13	0.348	326	0.312	283	0.225	213	0.175	163	0.121	141	0.155	98	0.106	56
DCP 6	.099	2.578	1.927	51	0.994	5	0.357	307	0.282	261	0.235	197	0.190	145	0.118	119	0.166	84	0.115	39
DCP 7	.149	2.129	1.884	43	0.871	349	0.428	283	0.306	225	0.284	172	0.226	115	0.135	74	0.148	48	0.122	338
DCP 8	.200	1.922	1.827	43	0.843	345	0.481	269	0.310	212	0.317	168	0.256	105	0.144	59	0.157	17	0.096	313
DCP 9	.250	1.730	1.711	36	0.746	324	0.518	234	0.349	167	0.333	120	0.290	51	0.206	0	0.216	304	0.148	230
DCP10	.300	1.591	1.578	31	0.642	311	0.511	220	0.368	147	0.393	87	0.281	11	0.177	313	0.159	258	0.123	190
DCP11	.399	1.448	1.500	28	0.580	293	0.561	203	0.462	122	0.328	52	0.242	337	0.159	267	0.095	205	0.094	160
DCP12	.501	1.206	1.266	20	0.482	257	0.477	165	0.381	77	0.265	354	0.164	271	0.138	202	0.081	125	0.068	57
DCP13	.600	1.034	0.991	14	0.418	219	0.382	129	0.306	37	0.204	299	0.130	207	0.098	150	0.092	64	0.045	343
DCP14	.701	0.826	0.712	9	0.416	190	0.312	96	0.216	355	0.156	245	0.087	151	0.063	82	0.047	339	0.006	299
DCP15	.800	0.523	0.467	2	0.323	174	0.221	72	0.140	315	0.117	210	0.071	98	0.027	39	0.012	254	0.015	100
DCP16	.900	0.325	0.472	331	0.382	154	0.311	18	0.251	226	0.195	73	0.177	267	0.164	111	0.162	333	0.105	188
DCP17	.969	0.249	0.380	322	0.335	159	0.333	13	0.300	232	0.239	93	0.224	303	0.196	148	0.187	12	0.142	231

TABLE A. ACCELERATION TARES

Transducer P1

Average Orifice Location, X/C = 0.010

Units: psi
$\Delta\alpha = 5^{o}$ (nominal)

F_D (Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.006	1.	0.014	-0.014	0.001	174.800
		2.	0.027	-0.021	-0.017	218.300
		3.	0.042	0.042	0.001	1.312
		4.	0.020	0.016	0.012	55.800
		5.	0.015	0.014	-0.006	336.200
		6.	0.017	0.016	0.005	15.890
		7.	0.012	0.012	0.003	15.670
		8.	0.023	0.002	-0.023	274.700
		9.	0.004	0.004	0.000	6.444
48.0	0.027	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.140	-0.073	0.120	121.200
		2.	0.069	0.057	-0.038	326.800
		3.	0.018	0.018	0.002	4.738
		4.	0.079	0.064	0.047	36.200
		5.	0.010	0.009	0.003	15.320
		6.	0.018	0.014	0.011	37.460
		7.	0.013	0.011	0.007	32.480
		8.	0.011	0.010	-0.005	335.000
		9.	0.009	-0.004	0.008	116.000
56.2	-0.005	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.077	0.077	0.008	6.257
		2.	0.026	-0.026	-0.001	182.500
		3.	0.071	-0.069	-0.019	195.500
		4.	0.026	0.023	0.012	26.900
		5.	0.023	0.023	0.001	1.818
		6.	0.033	-0.008	0.032	103.800
		7.	0.006	-0.004	0.005	127.000
		8.	0.005	0.005	-0.000	356.500
		9.	0.011	-0.008	-0.008	222.400
71.8	0.003	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.038	-0.036	-0.012	198.600
		2.	0.019	0.004	0.018	77.590
		3.	0.029	-0.012	0.027	113.700
		4.	0.009	0.008	0.005	32.060
		5.	0.014	0.012	-0.006	332.200
		6.	0.012	0.002	0.012	79.600
		7.	0.006	-0.003	-0.005	242.800
		8.	0.008	0.006	0.005	38.420
		9.	0.006	0.005	-0.002	341.200

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE B. ACCELERATION TARES

Transducer P2 — Acceleration Tares

Average Orifice Location, X/C = 0.020 — Units: psi, $\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	0.006	1.	0.015	-0.015	-0.002	186.400
		2.	0.017	-0.011	-0.013	229.700
		3.	0.033	0.033	0.002	2.787
		4.	0.017	0.014	0.010	34.970
		5.	0.019	0.019	-0.001	356.700
		6.	0.017	0.013	0.011	39.320
		7.	0.005	0.003	0.004	51.700
		8.	0.033	0.013	-0.030	294.300
		9.	0.008	0.008	0.002	16.940
48.0	0.035	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.140	-0.092	0.105	131.200
		2.	0.059	0.047	-0.036	323.100
		3.	0.016	0.015	0.007	24.330
		4.	0.082	0.058	0.059	45.590
		5.	0.027	0.025	0.007	16.130
		6.	0.017	-0.001	0.017	92.980
		7.	0.024	0.020	-0.012	328.100
		8.	0.015	0.015	0.003	11.570
		9.	0.019	0.012	-0.015	310.400
56.2	-0.003	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.100	0.100	0.003	1.997
		2.	0.037	-0.033	-0.018	208.400
		3.	0.060	-0.059	-0.054	222.200
		4.	0.025	0.022	0.012	27.360
		5.	0.018	0.012	0.013	47.370
		6.	0.059	-0.015	0.056	112.700
		7.	0.012	-0.002	0.012	101.000
		8.	0.015	0.015	-0.003	349.400
		9.	0.006	-0.002	-0.006	253.300
71.8	0.015	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.023	-0.020	-0.009	204.800
		2.	0.026	-0.025	0.004	170.900
		3.	0.058	-0.023	0.050	128.000
		4.	0.015	0.015	0.000	1.556
		5.	0.010	-0.009	-0.006	215.100
		6.	0.019	0.005	0.019	75.950
		7.	0.014	0.006	-0.013	294.900
		8.	0.005	-0.005	0.001	167.300
		9.	0.019	-0.007	0.018	111.100

TABLE C. ACCELERATION TARES

Transducer P03 — Acceleration Tares

Average Orifice Location, X/C = 0.030 — Units: psi, $\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.004	1.	0.001	-0.000	0.001	103.800
		2.	0.012	-0.009	-0.008	222.100
		3.	0.018	0.018	0.004	14.270
		4.	0.011	0.007	0.008	51.150
		5.	0.006	0.006	-0.000	357.400
		6.	0.007	-0.005	0.005	131.600
		7.	0.005	0.000	0.005	89.190
		8.	0.019	0.007	-0.017	293.700
		9.	0.004	0.004	-0.001	347.200
48.0	0.016	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.082	-0.049	0.065	127.000
		2.	0.041	0.037	-0.018	335.700
		3.	0.013	0.013	0.001	4.407
		4.	0.049	0.037	0.033	41.760
		5.	0.006	0.006	0.000	4.220
		6.	0.005	0.005	-0.000	359.900
		7.	0.006	0.005	-0.004	322.300
		8.	0.020	0.020	-0.003	352.500
		9.	0.009	-0.009	0.000	177.800
56.2	-0.007	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.055	0.055	0.007	6.933
		2.	0.022	-0.022	0.002	175.700
		3.	0.051	-0.043	-0.027	212.500
		4.	0.015	0.012	0.010	38.100
		5.	0.013	0.013	0.002	10.800
		6.	0.019	-0.013	0.014	132.800
		7.	0.008	-0.008	0.004	154.800
		8.	0.002	-0.002	-0.002	229.200
		9.	0.009	-0.006	-0.006	224.700
71.8	0.015	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.028	-0.026	-0.010	201.900
		2.	0.016	-0.013	0.010	141.300
		3.	0.019	-0.007	0.018	111.000
		4.	0.009	0.007	-0.007	314.900
		5.	0.006	-0.001	-0.006	255.900
		6.	0.020	-0.018	0.007	158.600
		7.	0.007	-0.004	-0.005	230.100
		8.	0.002	-0.001	0.002	108.300
		9.	0.003	0.003	-0.002	322.600

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TABLE D. ACCELERATION TARES

Transducer P04 — Acceleration Tares

Average Orifice Location, X/C = 0.049 — Units: psi, $\Delta\alpha = 5^o$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.015	1.	0.014	-0.011	0.009	139.200
		2.	0.014	-0.013	-0.006	206.800
		3.	0.035	0.027	0.022	39.270
		4.	0.021	0.019	0.010	27.250
		5.	0.007	-0.006	-0.002	201.500
		6.	0.007	-0.007	0.001	169.300
		7.	0.012	0.002	0.012	82.090
		8.	0.032	0.004	-0.031	277.400
		9.	0.028	0.022	0.018	59.270
48.0	0.026	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.068	-0.057	0.037	147.400
		2.	0.065	0.017	-0.063	285.500
		3.	0.039	0.014	-0.037	290.900
		4.	0.061	0.045	0.042	43.490
		5.	0.023	0.021	0.011	27.500
		6.	0.027	0.020	0.019	44.010
		7.	0.005	0.005	-0.001	352.700
		8.	0.023	0.019	0.014	36.260
		9.	0.006	-0.003	0.006	115.300
56.2	-0.022	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.040	0.038	-0.013	341.200
		2.	0.034	-0.028	0.019	146.100
		3.	0.049	-0.036	-0.033	222.700
		4.	0.031	0.021	0.022	46.460
		5.	0.021	0.017	-0.012	323.900
		6.	0.012	-0.009	0.008	139.600
		7.	0.017	0.006	-0.015	297.900
		8.	0.045	0.042	-0.015	340.200
		9.	0.036	-0.027	-0.023	220.300
71.8	0.005	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.028	-0.028	-0.000	180.300
		2.	0.025	-0.024	-0.004	190.400
		3.	0.048	-0.050	0.032	135.900
		4.	0.018	-0.000	-0.018	269.900
		5.	0.031	0.011	-0.029	291.400
		6.	0.015	0.007	0.014	63.960
		7.	0.029	0.029	-0.004	352.900
		8.	0.016	-0.011	0.011	133.200
		9.	0.015	-0.012	0.009	141.900

TABLE E. ACCELERATION TARES

Transducer P05

Average Orifice Location, X/C = 0.074

Acceleration Tares

Units: psi
$\Delta\alpha = 5^{o}$

F_D(Hz)	Steady					
24.2	0.001	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.014	-0.014	0.000	179.500
		2.	0.018	-0.011	-0.014	231.900
		3.	0.025	0.025	0.006	13.700
		4.	0.014	0.011	0.009	39.390
		5.	0.006	0.006	-0.001	348.900
		6.	0.005	0.005	0.000	0.537
		7.	0.002	-0.000	0.002	96.190
		8.	0.019	0.003	-0.018	280.600
		9.	0.006	0.002	0.005	69.520
48.0	0.022	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.083	-0.052	0.065	128.700
		2.	0.032	0.026	-0.018	325.600
		3.	0.024	0.023	-0.007	343.400
		4.	0.056	0.037	0.042	48.350
		5.	0.010	0.010	0.003	17.740
		6.	0.015	0.015	0.003	10.420
		7.	0.007	0.006	0.002	21.120
		8.	0.012	0.012	-0.001	356.600
		9.	0.002	0.002	-0.002	310.200
56.2	0.003	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.048	0.047	0.011	12.920
		2.	0.022	-0.021	-0.007	197.600
		3.	0.049	-0.041	-0.027	213.800
		4.	0.033	0.028	0.018	33.090
		5.	0.010	0.010	0.002	13.080
		6.	0.011	-0.011	0.003	164.900
		7.	0.013	0.004	0.012	72.470
		8.	0.005	0.002	0.005	64.270
		9.	0.005	-0.005	0.000	177.500
71.8	0.005	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.028	-0.028	-0.002	185.200
		2.	0.022	-0.013	0.018	126.700
		3.	0.027	-0.019	0.020	135.100
		4.	0.011	0.011	-0.001	353.700
		5.	0.016	-0.004	-0.016	255.600
		6.	0.013	-0.011	0.006	145.100
		7.	0.012	-0.012	-0.001	184.000
		8.	0.006	0.006	-0.002	343.400
		9.	0.014	-0.014	-0.005	199.200

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TABLE F. ACCELERATION TARES

Transducer P06 — Acceleration Tares

Average Orifice Location, X/C = 0.099 — Units: psi, $\Delta\alpha = 5^{\circ}$

F_D (Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.015	1.	0.001	-0.001	-0.000	199.400
		2.	0.020	-0.016	-0.012	216.800
		3.	0.020	0.018	0.007	22.140
		4.	0.014	0.013	0.005	18.590
		5.	0.007	0.007	-0.002	346.400
		6.	0.003	0.001	0.002	63.350
		7.	0.006	0.004	0.004	46.890
		8.	0.016	0.003	-0.015	282.600
		9.	0.005	0.005	0.001	15.040
48.0	0.015	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.095	-0.058	0.075	127.900
		2.	0.035	0.029	-0.016	331.400
		3.	0.019	0.018	-0.006	340.600
		4.	0.059	0.039	0.044	48.500
		5.	0.009	0.003	0.009	67.920
		6.	0.002	0.001	0.001	22.240
		7.	0.009	0.005	0.008	60.790
		8.	0.017	0.017	0.004	12.700
		9.	0.010	-0.002	0.009	100.100
56.2	-0.016	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.064	[illegible]	0.008	6.796
		2.	0.023	[illegible]	0.005	168.900
		3.	0.044	[illegible]	-0.009	192.600
		4.	0.025	[illegible]	0.014	35.240
		5.	0.006	[illegible]	0.006	97.010
		6.	0.025	[illegible]	0.020	119.800
		7.	0.011	[illegible]	0.011	90.680
		8.	0.014	[illegible]	-0.004	342.700
		9.	0.009	[illegible]	-0.000	182.500
71.8	-0.005	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.022	-0.022	-0.001	183.300
		2.	0.008	-0.007	0.004	150.900
		3.	0.024	-0.017	0.017	134.000
		4.	0.011	0.010	-0.003	345.200
		5.	-0.008	0.007	-0.004	352.600
		6.	0.015	-0.015	0.002	173.700
		7.	0.015	0.000	-0.015	271.500
		8.	0.009	-0.009	-0.001	187.[illegible]
		9.	0.009	0.005	0.007	52 [illegible]

TABLE G. ACCELERATION TARES

Transducer P07

Average Orifice Location, X/C = 0.149

Acceleration Tares

Units: psi

$\Delta\alpha = 5^{\circ}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.011	1.	0.009	-0.009	-0.001	187.100
		2.	0.014	-0.008	-0.011	234.300
		3.	0.018	0.016	0.009	28.720
		4.	0.010	0.007	0.008	47.920
		5.	0.005	0.005	0.000	0.597
		6.	0.005	0.004	0.004	46.650
		7.	0.013	0.000	0.013	89.290
		8.	0.017	0.001	-0.017	275.000
		9.	0.008	0.008	-0.001	350.300
48.0	-0.006	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.096	-0.054	0.079	124.400
		2.	0.036	0.030	-0.012	340.100
		3.	0.015	0.014	-0.006	338.100
		4.	0.048	0.028	0.039	55.760
		5.	0.009	0.005	0.007	53.300
		6.	0.004	0.003	-0.002	328.900
		7.	0.010	0.007	0.007	44.290
		8.	0.012	0.011	0.005	25.850
		9.	0.003	0.002	-0.002	310.300
56.2	-0.025	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.055	0.055	0.004	4.636
		2.	0.023	-0.022	-0.007	196.800
		3.	0.045	-0.041	-0.019	204.900
		4.	0.021	0.020	0.009	24.290
		5.	0.017	0.012	0.012	44.020
		6.	0.013	-0.009	0.011	128.500
		7.	0.010	0.001	0.010	86.810
		8.	0.009	-0.009	-0.002	194.200
		9.	0.004	0.000	0.004	64.880
71.8	-0.010	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.036	-0.036	-0.000	[illegible]
		2.	0.013	-0.011	0.006	[illegible]
		3.	0.009	-0.007	0.006	[illegible]
		4.	0.005	0.004	0.003	[illegible]
		5.	0.015	-0.004	-0.012	[illegible]
		6.	0.017	-0.015	0.007	154.900
		7.	0.012	-0.012	-0.001	185.500
		8.	0.003	0.003	-0.001	348.500
		9.	0.007	-0.006	-0.003	208.700

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TABLE H. ACCELERATION TARES

Transducer P08 — Acceleration Tares

Average Orifice Location, X/C = 0.200 — Units: psi, $\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	0.005	1.	0.008	-0.008	0.001	171.200
		2.	0.022	-0.016	-0.015	224.300
		3.	0.026	0.022	0.013	31.940
		4.	0.011	0.011	-0.002	349.500
		5.	0.023	0.023	0.003	8.500
		6.	0.019	0.009	0.017	61.110
		7.	0.021	0.021	0.005	14.870
		8.	0.024	0.002	-0.024	274.900
		9.	0.008	-0.002	-0.007	255.300
48.0	0.035	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.097	-0.046	0.085	118.400
		2.	0.052	0.049	-0.016	341.700
		3.	0.011	0.011	0.003	15.650
		4.	0.056	0.051	0.046	56.000
		5.	0.026	0.025	-0.014	529.000
		6.	0.010	0.010	-0.000	358.800
		7.	0.022	0.014	-0.017	309.500
		8.	0.022	0.020	-0.009	335.700
		9.	0.012	-0.007	-0.010	234.500
56.2	0.003	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.065	0.061	0.023	20.630
		2.	0.034	-0.013	-0.031	247.300
		3.	0.031	-0.029	-0.009	196.900
		4.	0.017	0.010	0.014	52.870
		5.	0.007	-0.004	0.00[illegible]	129.100
		6.	0.018	-0.011	0.014	128.900
		7.	0.012	0.005	0.012	76.860
		8.	0.009	0.006	-0.007	307.900
		9.	0.009	0.007	-0.005	326.500
71.8	0.021	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.014	0.012	-0.007	329.300
		2.	0.005	-0.002	-0.005	248.500
		3.	0.010	-0.008	-0.007	220.900
		4.	0.012	-0.002	-0.012	259.100
		5.	0.016	-0.001	-0.016	264.900
		6.	0.009	0.008	0.004	24.450
		7.	0.013	0.009	0.010	49.650
		8.	0.009	-0.007	-0.006	223.300
		9.	0.023	-0.023	-0.006	194.400

TABLE I. ACCELERATION TARES

Transducer P09 — Acceleration Tares

Average Orifice Location, X/C = 0.250 — Units: psi, $\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.013	1.	0.003	-0.000	0.003	91.900
		2.	0.006	0.002	-0.006	288.000
		3.	0.013	-0.007	0.011	123.800
		4.	0.002	0.001	0.002	74.260
		5.	0.009	-0.007	0.006	140.100
		6.	0.002	0.001	-0.002	302.400
		7.	0.005	0.004	0.001	14.770
		8.	0.026	-0.025	0.007	163.800
		9.	0.005	-0.005	0.000	177.700
48.0	-0.012	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.011	0.009	-0.006	325.200
		2.	0.004	0.004	-0.001	339.800
		3.	0.013	0.005	-0.012	294.400
		4.	0.134	-0.054	0.123	113.700
		5.	0.014	-0.003	0.014	104.300
		6.	0.015	-0.014	0.004	162.900
		7.	0.022	0.002	0.022	84.810
		8.	0.018	-0.018	-0.005	195.200
		9.	0.007	0.004	0.006	57.100
56.2	-0.008	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.062	0.058	-0.021	340.200
		2.	0.015	-0.008	-0.012	235.200
		3.	0.031	0.007	-0.030	283.900
		4.	0.021	-0.002	0.021	95.290
		5.	0.012	0.006	0.010	61.990
		6.	0.007	-0.007	0.003	159.100
		7.	0.006	0.001	-0.006	283.100
		8.	0.021	0.011	0.018	58.920
		9.	0.004	-0.004	-0.001	198.700
71.8	-0.010	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.038	0.027	-0.027	315.700
		2.	0.010	0.005	-0.008	301.400
		3.	0.006	0.002	0.006	71.420
		4.	0.013	-0.006	-0.012	243.700
		5.	0.006	-0.006	-0.003	205.100
		6.	0.015	0.015	0.004	13.400
		7.	0.014	0.013	-0.005	339.600
		8.	0.016	0.003	-0.015	281.800
		9.	0.003	-0.001	-0.003	255.100

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REPRODUCIBILITY OF THE
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TABLE J. ACCELERATION TARES

Transducer P10

Acceleration Tares

Average Orifice Location, X/C = 0.30

Units: psi
$\Delta\alpha = 5^{o}$

F_D(Hz)	Steady					
24.2	0.009	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.003	0.002	0.002	54.370
		2.	0.002	0.002	0.002	43.490
		3.	0.004	-0.002	0.003	117.500
		4.	0.005	0.002	0.005	71.070
		5.	0.001	0.000	0.001	74.910
		6.	0.003	0.003	0.000	6.036
		7.	0.002	0.002	-0.001	343.300
		8.	0.021	-0.020	0.007	161.800
		9.	0.007	-0.006	-0.005	217.900
48.0	0.003	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.007	0.003	-0.007	290.900
		2.	0.009	-0.005	-0.008	238.500
		3.	0.020	0.014	-0.015	313.500
		4.	0.112	-0.057	0.106	109.200
		5.	0.009	-0.006	0.007	131.200
		6.	0.015	-0.015	-0.005	197.600
		7.	0.017	0.004	0.017	77.210
		8.	0.013	-0.008	0.011	126.700
		9.	0.005	-0.002	0.005	117.000
56.2	0.004	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.058	0.054	-0.021	338.700
		2.	0.008	-0.005	-0.006	233.800
		3.	0.025	0.002	-0.025	275.100
		4.	0.018	0.001	0.018	86.490
		5.	0.003	-0.001	0.002	104.500
		6.	0.008	0.003	0.007	66.440
		7.	0.001	0.000	0.001	83.700
		8.	0.014	0.006	0.013	67.410
		9.	0.008	-0.008	-0.002	193.800
71.8	0.002	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.022	0.009	-0.020	294.100
		2.	0.007	-0.006	-0.004	217.900
		3.	0.011	0.010	0.003	16.150
		4.	0.012	-0.010	-0.005	204.500
		5.	0.007	-0.005	0.005	133.900
		6.	0.005	0.003	-0.004	311.400
		7.	0.007	0.007	-0.001	355.800
		8.	0.009	0.007	-0.007	314.100
		9.	0.003	0.002	0.002	39.810

TABLE K. ACCELERATION TARES

Transducer P11

Acceleration Tares

Average Orifice Location, X/C - 0.399

Units: psi
$\Delta\alpha = 5^{o}$

F_D (Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.021	1.	0.014	-0.012	0.007	150.300
		2.	0.008	0.008	-0.001	352.500
		3.	0.006	-0.001	0.006	95.260
		4.	0.008	-0.003	0.008	113.000
		5.	0.008	-0.005	-0.006	234.400
		6.	0.002	-0.002	0.000	174.200
		7.	0.008	0.008	-0.003	339.100
		8.	0.034	-0.033	0.004	173.200
		9.	0.011	-0.005	-0.010	243.500
48.0	-0.032	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.042	-0.041	-0.007	189.400
		2.	0.011	0.003	0.011	75.020
		3.	0.020	-0.001	-0.019	268.200
		4.	0.157	-0.097	0.123	128.200
		5.	0.015	-0.011	0.011	132.900
		6.	0.013	-0.012	-0.005	202.400
		7.	0.034	-0.004	0.034	96.200
		8.	0.017	-0.007	0.015	114.200
		9.	0.006	-0.005	0.004	143.500
56.2	-0.021	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.034	0.019	-0.028	304.100
		2.	0.004	0.004	0.001	12.150
		3.	0.029	0.000	-0.029	270.700
		4.	0.019	-0.008	0.017	115.600
		5.	0.012	-0.003	0.011	104.400
		6.	0.019	-0.012	0.015	28.700
		7.	0.007	-0.005	-0.006	228.800
		8.	0.032	-0.002	0.032	94.270
		9.	0.005	0.001	-0.005	276.400
71.8	-0.028	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.080	-0.067	-0.043	212.600
		2.	0.028	0.025	-0.011	336.200
		3.	0.026	0.019	0.018	42.970
		4.	0.018	-0.017	-0.006	198.600
		5.	0.024	0.007	0.023	72.010
		6.	0.022	0.011	0.019	60.560
		7.	0.015	0.015	0.003	15.200
		8.	0.001	-0.001	-0.001	217.000
		9.	0.006	-0.006	-0.001	192.600

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE L. ACCELERATION TARES

Transducer P12

Average Orifice Location, X/C = 0.501

Acceleration Tares

Units: psi
$\Delta\alpha = 5^{o}$

F_D (Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.010	1.	0.002	-0.000	0.002	100.500
		2.	0.005	0.005	0.002	27.030
		3.	0.005	-0.005	0.002	158.800
		4.	0.008	-0.000	0.008	90.490
		5.	0.002	0.001	0.001	40.530
		6.	0.003	0.003	0.000	4.264
		7.	0.001	0.000	-0.001	261.600
		8.	0.020	-0.020	0.003	171.400
		9.	0.009	-0.007	-0.005	216.100
48.0	-0.014	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.017	0.017	0.005	16.380
		2.	0.007	-0.004	-0.005	233.300
		3.	0.020	0.020	0.003	7.361
		4.	0.127	-0.074	0.103	125.700
		5.	0.010	-0.010	-0.002	191.500
		6.	0.012	-0.012	-0.000	181.200
		7.	0.021	-0.007	0.020	109.900
		8.	0.007	-0.005	0.004	141.000
		9.	0.013	-0.010	0.009	137.900
56.2	-0.008	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.084	0.084	0.002	1.264
		2.	0.018	-0.007	-0.017	246.200
		3.	0.038	0.032	-0.022	325.500
		4.	0.025	-0.016	0.019	131.000
		5.	0.006	-0.004	0.004	129.400
		6.	0.012	-0.011	0.004	160.100
		7.	0.002	-0.001	-0.001	224.300
		8.	0.014	-0.000	0.014	90.100
		9.	0.002	-0.001	-0.002	235.500
71.8	-0.009	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.054	0.052	-0.014	345.000
		2.	0.023	-0.019	-0.014	216.100
		3.	0.008	0.003	-0.008	268.100
		4.	0.004	0.004	-0.002	338.200
		5.	0.012	-0.009	0.009	135.800
		6.	0.007	0.005	0.005	41.570
		7.	0.012	0.012	-0.001	355.400
		8.	0.010	0.010	-0.002	349.000
		9.	0.008	0.008	0.000	1.685

TABLE M. ACCELERATION TARES

Transducer P13 — Acceleration Tares

Average Orifice Location, X/C = 0.600 — Units: psi, $\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.027	1.	0.006	0.005	-0.003	327.700
		2.	0.011	0.009	0.006	35.410
		3.	0.008	-0.006	0.006	134.300
		4.	0.021	0.002	0.021	85.310
		5.	0.007	-0.007	0.001	168.600
		6.	0.006	0.005	0.005	54.360
		7.	0.004	0.002	0.004	65.530
		8.	0.015	-0.015	0.003	167.900
		9.	0.006	-0.006	-0.005	260.600
48.0	-0.043	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.019	0.014	-0.013	317.200
		2.	0.013	-0.002	-0.012	259.200
		3.	0.031	0.020	-0.024	310.700
		4.	0.145	-0.081	0.120	124.100
		5.	0.017	-0.014	0.010	144.900
		6.	0.020	-0.011	0.017	122.100
		7.	0.019	0.001	0.019	87.420
		8.	0.010	0.009	0.005	15.860
		9.	0.015	0.002	0.015	82.000
56.2	-0.025	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.083	0.083	-0.001	359.000
		2.	0.015	-0.015	0.002	171.300
		3.	0.041	0.017	-0.037	294.100
		4.	0.036	-0.013	0.033	110.700
		5.	0.030	0.007	0.029	77.050
		6.	0.015	-0.006	0.014	112.400
		7.	0.016	-0.002	-0.016	265.200
		8.	0.029	-0.001	0.029	91.750
		9.	0.011	0.002	-0.011	278.600
71.8	-0.017	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.062	0.050	-0.037	323.200
		2.	0.006	0.006	0.000	0.290
		3.	0.014	0.004	-0.013	286.000
		4.	0.010	-0.010	0.001	173.400
		5.	0.015	0.003	0.013	14.960
		6.	0.017	0.007	0.016	66.830
		7.	0.017	0.015	0.007	24.740
		8.	0.015	0.012	-0.004	340.400
		9.	0.010	-0.010	0.001	176.600

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE N. ACCELERATION TARES

Transducer P14

Average Orifice Location, X/C = 0.701

Acceleration Tares

Units: psi
$\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.001	1.	0.007	0.006	-0.002	343.700
		2.	0.011	0.010	-0.003	342.500
		3.	0.011	-0.010	0.004	156.100
		4.	0.002	-0.002	0.001	159.500
		5.	0.009	-0.006	-0.007	232.800
		6.	0.002	-0.002	-0.001	191.700
		7.	0.008	-0.006	0.004	144.000
		8.	0.023	-0.023	0.005	166.800
		9.	0.010	-0.008	-0.006	219.300
48.0	-0.010	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.017	0.016	-0.006	338.100
		2.	0.004	-0.003	-0.002	208.800
		3.	0.020	0.017	-0.011	328.200
		4.	0.126	-0.071	0.104	124.500
		5.	0.009	-0.005	0.007	125.600
		6.	0.007	-0.005	0.004	142.800
		7.	0.023	-0.001	0.023	92.790
		8.	0.010	0.004	0.009	67.950
		9.	0.005	-0.003	0.004	122.900
56.2	-0.009	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.083	0.082	-0.016	348.700
		2.	0.011	0.001	-0.011	275.600
		3.	0.024	0.014	-0.019	306.000
		4.	0.024	-0.006	0.023	104.200
		5.	0.010	0.005	-0.009	297.000
		6.	0.012	-0.007	0.010	127.600
		7.	0.012	-0.008	-0.010	230.900
		8.	0.019	0.002	0.019	85.230
		9.	0.011	-0.002	-0.011	260.500
71.8	-0.001	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.036	0.029	-0.022	322.500
		2.	0.014	-0.013	-0.006	206.000
		3.	0.010	0.008	0.007	41.450
		4.	0.016	-0.012	0.011	136.800
		5.	0.006	-0.005	0.002	155.500
		6.	0.008	-0.001	0.008	98.180
		7.	0.002	0.002	0.001	24.940
		8.	0.003	0.002	-0.002	314.500
		9.	0.004	-0.002	-0.004	238.000

TABLE O. ACCELERATION TARES

Transducer P15

Average Orifice Location, X/C = 0.800

Acceleration Tares

Units: psi
$\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.015	1.	0.004	0.003	0.002	27.100
		2.	0.004	0.004	-0.001	338.600
		3.	0.005	-0.003	0.005	120.700
		4.	0.008	-0.001	0.008	98.990
		5.	0.001	-0.001	-0.000	165.500
		6.	0.004	0.003	-0.002	323.800
		7.	0.004	-0.002	-0.004	238.400
		8.	0.023	-0.022	0.004	169.500
		9.	0.003	-0.003	0.000	179.000
48.0	-0.020	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.015	0.014	0.005	19.790
		2.	0.010	-0.004	-0.009	246.400
		3.	0.021	0.019	-0.010	332.100
		4.	0.132	-0.074	0.109	124.100
		5.	0.017	-0.017	-0.004	192.800
		6.	0.017	-0.010	0.014	125.800
		7.	0.026	0.000	0.026	89.040
		8.	0.020	0.018	0.008	22.470
		9.	0.007	0.004	0.005	55.960
56.2	-0.006	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.095	0.093	-0.016	350.100
		2.	0.010	-0.003	-0.010	250.900
		3.	0.055	0.034	-0.040	310.600
		4.	0.014	-0.008	0.012	121.900
		5.	0.003	0.003	0.001	12.900
		6.	0.013	-0.007	0.011	123.300
		7.	0.013	0.011	-0.006	332.200
		8.	0.025	-0.001	0.025	92.210
		9.	0.012	-0.003	-0.012	254.500
71.8	-0.006	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.045	0.045	-0.004	354.900
		2.	0.014	-0.014	-0.001	185.000
		3.	0.015	0.015	0.002	8.229
		4.	0.006	0.003	0.005	57.400
		5.	0.009	0.003	0.009	71.260
		6.	0.026	0.018	0.019	47.650
		7.	0.002	0.002	0.001	29.250
		8.	0.004	0.001	-0.003	295.900
		9.	0.020	-0.014	0.015	134.200

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE P. ACCELERATION TARES

Transducer P16

Acceleration Tares

Average Orifice Location, X/C = 0.900

Units: psi
$\Delta\alpha = 5^{o}$

F_D(Hz)	Steady	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
24.2	-0.008	1.	0.001	-0.001	0.001	120.200
		2.	0.008	0.007	-0.004	329.700
		3.	0.009	-0.009	-0.003	199.400
		4.	0.013	-0.004	0.012	110.300
		5.	0.002	0.002	-0.001	338.400
		6.	0.001	0.001	-0.000	336.900
		7.	0.004	0.001	0.003	76.410
		8.	0.025	-0.025	-0.003	186.300
		9.	0.002	0.000	-0.002	273.500
48.0	-0.021	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.009	0.008	0.005	31.290
		2.	0.013	-0.013	0.001	176.500
		3.	0.016	0.012	-0.010	320.500
		4.	0.147	-0.076	0.126	121.000
		5.	0.016	-0.009	0.014	122.100
		6.	0.012	-0.007	0.010	125.600
		7.	0.053	-0.008	0.052	104.300
		8.	0.017	0.017	-0.003	349.200
		9.	0.021	-0.002	0.021	95.420
56.2	-0.014	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.092	0.092	-0.005	357.000
		2.	0.014	-0.011	-0.009	220.300
		3.	0.032	0.014	-0.029	296.300
		4.	0.037	-0.010	0.036	106.200
		5.	0.020	-0.018	0.008	155.400
		6.	0.014	0.009	0.011	50.220
		7.	0.012	-0.010	-0.006	213.000
		8.	0.010	-0.000	0.010	92.000
		9.	0.013	-0.013	0.001	177.200
71.8	-0.022	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.040	0.029	-0.027	316.500
		2.	0.017	-0.014	-0.009	212.600
		3.	0.011	0.006	-0.010	301.300
		4.	0.009	0.009	0.002	13.030
		5.	0.023	-0.007	0.022	108.500
		6.	0.009	0.002	0.009	76.120
		7.	0.007	0.007	-0.002	345.400
		8.	0.009	0.008	0.003	19.000
		9.	0.004	0.002	0.003	54.330

TABLE Q. ACCELERATION TARES

Transducer P17

Average Orifice Location, X/C = 0.969

Acceleration Tares

Units: psi

$\overline{\Delta\alpha} = 5^{o}$

F_D(Hz)	Steady					
24.2	-0.029	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.005	0.005	-0.001	353.200
		2.	0.007	0.007	0.000	1.962
		3.	0.003	-0.001	0.003	120.000
		4.	0.007	0.006	0.002	15.880
		5.	0.008	0.002	-0.008	284.300
		6.	0.004	-0.002	-0.003	231.800
		7.	0.004	0.004	-0.000	356.500
		8.	0.020	-0.019	-0.008	205.200
		9.	0.014	-0.012	-0.007	212.400
48.0	-0.037	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.011	0.010	-0.005	332.000
		2.	0.008	-0.004	0.007	120.700
		3.	0.005	0.004	-0.003	322.900
		4.	0.154	-0.085	0.106	128.200
		5.	0.020	-0.020	0.004	169.600
		6.	0.018	-0.015	-0.013	224.800
		7.	0.024	0.001	0.024	86.870
		8.	0.012	-0.001	0.012	97.090
		9.	0.014	-0.002	0.014	99.720
56.2	-0.045	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.066	0.064	-0.016	346.300
		2.	0.007	-0.005	-0.005	225.900
		3.	0.027	0.014	-0.024	299.600
		4.	0.017	-0.005	0.016	107.300
		5.	0.008	0.001	0.008	[illegible]
		6.	0.010	-0.008	0.006	140.200
		7.	0.005	0.005	-0.000	358.300
		8.	0.021	-0.013	0.016	128.000
		9.	0.014	-0.010	-0.009	223.700
71.8	-0.024	HARM	RESULTANT	SINE COEFF	COS COEFF	PHASE
		1.	0.056	0.015	-0.052	295.700
		2.	0.011	-0.007	-0.009	252.600
		3.	0.019	0.004	0.019	11.000
		4.	0.019	-0.005	-0.019	255.800
		5.	0.002	-0.000	-0.002	265.600
		6.	0.058	0.057	0.010	15.300
		7.	0.011	-0.008	-0.007	219.800
		8.	0.015	0.002	-0.014	277.100
		9.	0.020	-0.005	0.019	104.900

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	68.67	0.483	0.212	5.91	0.0	0.02	12007.1	20

V	U	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
72.4 (237.4)	13406. (280.0)	0.346 07	-0.078	0.557	4.12	-0.00112	0.714	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.015	5.906	0	0.507	344	0.136	196	0.066	132	0.026	123	0.010	109	0.023	251	0.016	72	0.017	68
CN		0.141	0.356	33	0.038	52	0.022	304	0.001	54	0.012	295	0.006	211	0.001	255	0.008	147	0.002	83
CM		-0.023	0.053	293	0.008	300	0.007	138	0.002	175	0.003	88	0.002	44	0.001	354	0.003	320	0.001	291
DCP 1	.010	-0.534	2.476	348	0.242	359	0.059	118	0.011	162	0.023	171	0.016	114	0.008	298	0.004	125	0.014	244
DCP 2	.020	-0.337	1.780	358	0.176	354	0.014	121	0.025	212	0.021	207	0.018	159	0.014	289	0.013	134	0.013	299
DCP 3	.030	0.049	1.478	358	0.129	346	0.016	220	0.008	126	0.023	192	0.018	244	0.015	87	0.014	144	0.009	203
DCP 4	.049	-0.023	1.205	1	0.106	359	0.015	147	0.006	20	0.029	201	0.010	155	0.013	258	0.017	214	0.008	52
DCP 5	.074	0.160	0.973	3	0.086	357	0.009	212	0.024	150	0.013	206	0.009	214	0.004	340	0.004	103	0.011	129
DCP 6	.099	0.370	0.840	8	0.080	13	0.019	284	0.029	147	0.012	264	0.015	233	0.003	240	0.006	171	0.014	264
DCP 7	.149	0.236	0.637	15	0.073	27	0.018	271	0.013	136	0.015	251	0.013	129	0.009	246	0.008	6	0.012	50
DCP 8	.200	0.252	0.564	27	0.080	42	0.029	279	0.016	292	0.015	342	0.006	45	0.008	107	0.012	262	0.019	157
DCP 9	.250	0.195	0.495	28	0.053	47	0.032	297	0.014	190	0.015	192	0.018	161	0.009	52	0.020	107	0.009	194
DCP10	.300	0.211	0.417	35	0.046	42	0.016	276	0.008	225	0.012	245	0.002	113	0.004	268	0.014	145	0.011	351
DCP11	.349	0.228	0.362	59	0.046	83	0.029	318	0.006	316	0.019	324	0.016	257	0.013	302	0.005	186	0.019	81
DCP12	.501	0.161	0.360	60	0.053	69	0.031	288	0.010	89	0.013	256	0.003	71	0.015	326	0.005	302	0.013	354
DCP13	.600	0.209	0.308	68	0.057	89	0.037	296	0.015	58	0.026	281	0.003	10	0.021	14	0.030	168	0.015	290
DCP14	.701	0.201	0.249	76	0.030	108	0.024	318	0.014	359	0.011	239	0.009	257	0.017	129	0.012	87	0.010	197
DCP15	.800	0.097	0.188	89	0.028	103	0.025	335	0.005	351	0.011	283	0.024	219	0.015	166	0.015	121	0.020	97
DCP16	.900	-0.073	0.086	103	0.029	111	0.036	293	0.021	311	0.009	191	0.019	214	0.016	228	0.013	226	0.015	302
DCP17	.969	0.010	0.049	166	0.029	243	0.037	17	0.017	145	0.022	255	0.014	72	0.020	178	0.030	181	0.026	142

FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	68.58	0.499	0.205	5.95	0.0	2.52	12007.2	20

V	U	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
69.9 (229.4)	12655. (264.3)	0.338 07	-0.083	0.766	6.64	-0.00115	0.712	0.0

HARMONIC ANALYSIS

DATA TYPE	K/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.520	5.946	0	0.511	345	0.150	189	0.072	136	0.006	129	0.019	14	0.016	227	0.025	123	0.002	123
CN		0.365	0.355	34	0.050	61	0.012	329	0.007	306	0.004	199	0.001	83	0.004	22	0.006	145	0.005	98
CM		-0.020	0.057	298	0.013	294	0.006	168	0.004	156	0.000	170	0.002	302	0.001	123	0.002	283	0.002	299
DCP 1	.010	0.997	2.352	349	0.232	354	0.061	166	0.024	139	0.030	198	0.002	355	0.019	323	0.008	303	0.018	63
DCP 2	.020	0.756	1.628	358	0.187	0	0.018	183	0.016	196	0.039	179	0.007	349	0.014	57	0.006	155	0.019	4
DCP 3	.030	0.974	1.521	358	0.156	356	0.015	274	0.003	249	0.017	172	0.019	254	0.010	167	0.018	100	0.009	0
DCP 4	.049	0.862	1.249	1	0.129	358	0.013	168	0.010	229	0.030	205	0.013	264	0.012	90	0.019	244	0.004	144
DCP 5	.074	0.812	1.004	4	0.104	1	0.026	196	0.024	164	0.022	228	0.021	295	0.016	71	0.013	183	0.006	72
DCP 6	.099	0.934	0.849	9	0.097	10	0.017	214	0.012	186	0.021	232	0.022	297	0.015	73	0.026	245	0.006	220
DCP 7	.149	0.645	0.638	16	0.084	27	0.026	190	0.013	223	0.014	219	0.016	312	0.026	96	0.008	149	0.011	285
DCP 8	.200	0.581	0.561	29	0.071	39	0.026	247	0.008	260	0.008	230	0.023	17	0.011	354	0.007	26	0.038	72
DCP 9	.250	0.473	0.514	26	0.070	49	0.007	30	0.005	211	0.016	208	0.003	268	0.009	228	0.022	155	0.010	324
DCP10	.300	0.471	0.457	32	0.067	52	0.019	297	0.008	226	0.007	42	0.004	85	0.012	147	0.006	164	0.012	93
DCP11	.349	0.425	0.361	57	0.070	87	0.023	17	0.018	301	0.012	87	0.013	251	0.017	6	0.008	153	0.008	117
DCP12	.501	0.277	0.383	63	0.077	79	0.017	331	0.008	224	0.012	86	0.011	114	0.007	345	0.002	50	0.006	155
DCP13	.600	0.322	0.248	72	0.062	111	0.017	327	0.010	350	0.007	95	0.014	106	0.020	3	0.017	195	0.011	133
DCP14	.701	0.277	0.299	84	0.064	86	0.029	349	0.019	359	0.025	271	0.016	75	0.004	350	0.011	118	0.003	291
DCP15	.800	0.147	0.213	95	0.039	118	0.042	341	0.011	338	0.004	262	0.004	104	0.007	67	0.015	59	0.007	64
DCP16	.920	-0.051	0.108	126	0.038	89	0.019	338	0.024	336	0.013	119	0.008	76	0.011	327	0.017	171	0.025	174
DCP17	.969	-0.007	0.044	191	0.049	195	0.015	27	0.016	312	0.010	288	0.027	203	0.038	219	0.024	40	0.031	95

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TABLE

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.48	0.511	0.201	5.93	0.0	5.05	12007.3	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
68.3 (224.0)	12099. (252.7)	0.32E 07	-0.081	1.025	8.71	-0.00120	0.726	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.053	5.929	0	0.519	345	0.149	185	0.065	136	0.021	349	0.024	28	0.017	188	0.023	129	0.011	182
CN		0.593	0.371	35	0.053	59	0.024	353	0.010	268	0.002	43	0.004	247	0.006	291	0.005	178	0.005	74
CM		-0.015	0.057	297	0.014	282	0.009	188	0.004	119	0.003	257	0.001	47	0.002	109	0.002	344	0.002	266
DCP 1	.010	2.538	2.438	349	0.219	324	0.092	168	0.038	94	0.037	236	0.011	104	0.018	296	0.015	162	0.013	312
DCP 2	.020	1.960	1.882	358	0.179	1	0.024	184	0.019	119	0.020	215	0.013	189	0.011	270	0.010	15	0.029	11
DCP 3	.030	1.977	1.904	356	0.142	8	0.016	198	0.023	108	0.026	231	0.003	279	0.008	332	-0.005	25	0.006	332
DCP 4	.049	1.606	1.306	2	0.125	358	0.019	166	0.017	148	0.033	256	0.008	203	0.007	269	0.008	273	0.004	268
DCP 5	.074	1.483	1.029	4	0.104	357	0.017	197	0.025	175	0.024	245	0.002	142	0.013	55	0.010	94	0.010	117
DCP 6	.099	1.481	0.873	10	0.090	11	0.014	292	0.023	169	0.014	286	0.014	285	0.004	186	0.009	302	0.008	382
DCP 7	.149	1.071	0.678	17	0.063	26	0.009	293	0.015	219	0.014	236	0.023	283	0.015	208	0.002	107	0.008	123
DCP 8	.200	0.916	0.596	28	0.070	44	0.038	284	0.013	245	0.017	283	0.005	273	0.006	177	0.011	285	0.022	80
DCP 9	.250	0.753	0.516	30	0.080	54	0.020	323	0.016	131	0.017	301	0.011	153	0.017	252	0.011	129	0.012	199
DCP10	.300	0.718	0.459	36	0.066	61	0.025	331	0.010	275	0.005	149	0.014	76	0.013	338	0.029	194	0.015	304
DCP11	.399	0.635	0.386	59	0.068	87	0.040	3	0.027	306	0.023	40	0.014	227	0.005	22	0.012	220	0.008	71
DCP12	.501	0.431	0.373	62	0.077	80	0.045	353	0.019	252	0.006	178	0.010	302	0.014	335	0.004	222	0.004	291
DCP13	.600	0.417	0.311	72	0.074	89	0.042	354	0.025	252	0.009	98	0.017	263	0.016	286	0.003	68	0.010	311
DCP14	.701	0.362	0.258	83	0.065	82	0.026	15	0.029	289	0.009	57	0.004	276	0.011	303	0.003	179	0.019	82
DCP15	.800	0.182	0.209	94	0.043	84	0.034	5	0.013	248	0.017	45	0.014	191	0.013	263	0.012	65	0.009	119
DCP16	.900	-0.031	0.108	118	0.025	99	0.036	343	0.010	6	0.016	52	0.023	57	0.008	119	0.017	219	0.029	148
DCP17	.969	-0.006	0.020	165	0.030	115	0.050	63	0.028	13	0.031	101	0.023	235	0.009	265	0.024	150	0.041	19

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TABLE

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.50	0.511	0.201	5.93	0.0	7.54	12007.4	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
68.3 (224.1)	12104. (252.8)	0.32E 07	-0.085	1.248	11.64	-0.00136	0.822	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.542	5.930	0	0.509	344	0.159	186	0.062	129	0.026	353	0.020	12	0.022	192	0.024	114	0.00[illegible]	198
CN		0.806	0.383	36	0.060	65	0.015	302	0.010	255	0.003	290	0.009	251	0.007	331	0.006	109	0.005	99
CM		-0.010	0.063	292	0.014	290	0.004	130	0.003	67	0.002	265	0.003	84	0.002	134	0.002	257	0.001	270
DCP 1	.010	3.849	2.155	347	0.291	34	0.153	339	0.085	226	0.057	245	0.001	206	0.024	146	0.025	122	0.012	72
DCP 2	.020	3.042	1.892	358	0.185	1	0.019	131	0.028	160	0.027	278	0.027	139	0.012	355	0.013	254	0.017	331
DCP	.030	2.932	1.906	358	0.149	359	0.012	128	0.015	142	0.019	272	0.009	287	0.007	126	0.017	193	0.004	224
DCP 4	.049	2.418	1.312	1	0.145	5	0.027	90	0.012	36	0.040	264	0.013	162	0.018	295	0.019	215	0.025	44
DCP 5	.074	2.140	1.047	4	0.108	7	0.014	126	0.004	98	0.023	263	0.010	236	0.003	293	0.020	136	0.019	72
DCP 6	.099	2.012	0.894	9	0.093	19	0.007	316	0.005	83	0.022	272	0.001	137	0.009	208	0.022	103	0.012	57
DCP 7	.149	1.474	0.678	16	0.093	36	0.015	293	0.021	269	0.006	304	0.019	314	0.015	74	0.007	103	0.010	132
DCP 8	.200	1.236	0.599	29	0.079	53	0.002	45	0.006	47	0.019	281	0.008	15	0.024	339	0.008	275	0.022	121
DCP 9	.250	1.029	0.537	31	0.079	51	0.027	245	0.005	328	0.010	280	0.014	263	0.009	327	0.018	53	0.00[illegible]	107
DCP10	.300	0.946	0.452	38	0.062	49	0.026	248	0.012	282	0.009	242	0.013	241	0.004	5	0.016	48	0.010	122
DCP11	.399	0.815	0.402	62	0.078	86	0.026	318	0.016	314	0.022	50	0.024	240	0.012	353	0.010	72	0.009	196
DCP12	.501	0.574	0.410	62	0.079	84	0.025	290	0.024	253	0.006	268	0.007	177	0.017	301	0.012	189	0.006	278
DCP13	.600	0.507	0.348	71	0.070	101	0.029	283	0.014	253	0.003	37	0.005	113	0.010	340	0.017	150	0.004	180
DCP14	.701	0.422	0.286	82	0.055	79	0.014	324	0.027	251	0.007	238	0.022	276	0.002	144	0.006	291	0.006	11
DCP15	.800	0.225	0.215	90	0.057	100	0.027	318	0.015	221	0.006	56	0.016	227	0.003	46	0.010	67	0.014	61
DCP16	.900	-0.018	0.130	106	0.045	109	0.012	276	0.012	169	0.022	99	0.022	314	0.001	330	0.016	83	0.013	150
DCP17	.969	-0.012	0.059	138	0.028	109	0.020	48	0.013	357	0.011	267	0.011	109	0.024	197	0.010	23	0.020	61

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	58.15	0.913	0.199	5.93	0.0	10.04	12007.5	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
67.7 (222.1)	11917. (248.9)	9.32E 07	-0.074	1.489	13.68	-0.00141	0.844	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		10.036	5.927	0	0.500	344	0.156	183	0.067	117	0.046	346	0.018	12	0.030	189	0.020	136	0.005	185
CN		1.016	0.385	37	0.066	56	0.022	318	0.009	308	0.009	9	0.014	240	0.003	142	0.003	163	0.000	119
CM		-0.005	0.064	290	0.013	269	0.008	157	0.005	108	0.004	216	0.005	66	0.002	331	0.001	357	0.003	309
DCP 1	.010	5.097	1.924	348	0.279	16	0.149	154	0.162	45	0.023	145	0.073	16	0.028	358	0.029	10	0.015	319
DCP 2	.020	4.206	1.864	358	0.189	5	0.022	245	0.025	80	0.021	269	0.003	0	0.009	167	0.011	173	0.009	72
DCP 3	.030	3.881	1.596	355	0.153	3	0.031	279	0.018	79	0.024	264	0.013	302	0.008	152	0.008	135	0.003	282
DCP 4	.049	3.236	1.309	1	0.140	10	0.009	84	0.008	170	0.025	272	0.027	164	0.022	304	0.018	199	0.011	58
DCP 5	.074	2.789	1.033	5	0.099	14	0.017	205	0.009	186	0.024	225	0.013	180	0.015	69	0.007	145	0.025	115
DCP 6	.099	2.541	0.875	10	0.093	24	0.012	228	0.018	179	0.015	330	0.006	288	0.005	194	0.014	210	0.011	110
DCP 7	.149	1.884	0.679	17	0.089	36	0.013	320	0.020	176	0.014	268	0.012	291	0.005	64	0.003	43	0.010	330
DCP 8	.200	1.562	0.586	28	0.086	51	0.027	270	0.003	71	0.013	295	0.012	178	0.012	304	0.011	182	0.010	72
DCP 9	.250	1.309	0.557	29	0.075	44	0.017	252	0.016	78	0.021	327	0.014	181	0.009	327	0.013	271	0.015	48
DCP10	.300	1.170	0.470	36	0.069	51	0.023	288	0.010	348	0.006	309	0.004	167	0.005	73	0.015	78	0.009	40
DCP11	.349	0.984	0.410	62	0.080	84	0.043	331	0.036	348	0.023	41	0.024	247	0.005	38	0.003	327	0.015	135
DCP12	.501	0.707	0.404	63	0.074	61	0.033	317	0.020	324	0.017	73	0.013	292	0.012	230	0.006	104	0.014	184
DCP13	.600	0.591	0.329	73	0.069	72	0.044	308	0.023	307	0.019	356	0.025	254	0.008	178	0.010	103	0.023	179
DCP14	.701	0.486	0.300	83	0.071	84	0.024	356	0.033	272	0.016	27	0.025	266	0.011	83	0.005	176	0.006	88
DCP15	.800	0.256	0.238	91	0.056	84	0.037	334	0.010	271	0.013	314	0.027	248	0.018	137	0.008	202	0.017	82
DCP16	.900	0.005	0.193	98	0.045	75	0.027	334	0.004	238	0.008	76	0.014	264	0.007	125	0.015	237	0.008	163
DCP17	.969	-0.003	0.060	111	0.022	52	0.021	49	0.001	57	0.009	12	0.031	184	0.015	206	0.011	109	0.027	104

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	67.57	0.908	0.199	5.90	0.0	12.52	12007.6	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
67.7 (222.2)	11937. (249.3)	9.32E 07	-0.068	1.595	16.59	-0.00123	0.739	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.520	5.902	0	0.496	343	0.151	184	0.057	120	0.043	339	0.019	60	0.024	181	0.011	5	0.005	261
CN		1.155	0.381	33	0.059	62	0.014	311	0.011	316	0.006	44	0.007	223	0.009	135	0.002	128	0.004	123
CM		-0.002	0.055	291	0.017	275	0.005	137	0.005	130	0.005	267	0.001	43	0.002	317	0.000	243	0.001	325
DCP 1	.010	5.831	1.581	359	0.484	339	0.216	170	0.151	170	0.031	184	0.077	173	0.029	171	0.015	86	0.051	289
DCP 2	.020	4.974	1.750	1	0.304	1	0.044	199	0.040	91	0.035	283	0.013	213	0.009	44	0.008	30	0.002	19
DCP 3	.030	4.614	1.578	357	0.164	359	0.003	127	0.002	43	0.034	258	0.007	293	0.013	9	0.008	151	0.013	330
DCP 4	.049	3.686	1.317	8	0.202	331	0.073	148	0.062	40	0.062	278	0.026	197	0.011	274	0.007	137	0.014	64
DCP 5	.074	3.142	1.077	10	0.128	328	0.049			0	0.026	256	0.012	111	0.014	105	0.017	170	0.019	135
DCP 6	.099	2.842	0.917	17	0.069	334	0.034			344	0.006	292	0.011	281	0.004	105	0.006	209	0.006	80
DCP 7	.149	2.148	0.717	14	0.029	0	0.019			12	0.019	262	0.004	248	0.012	81	0.013	83	0.008	82
DCP 8	.200	1.632	0.662	14	0.066	120	0.052			5	0.031	347	0.022	179	0.008	138	0.014	180	0.025	62
DCP 9	.250	1.515	0.520	23	0.118	75	0.053	300			0.033	330	0.031	182	0.010	107	0.006	113	0.007	23
DCP10	.300	1.350	0.451	29	0.108	72	0.048	285	0.0		0.016	2	0.005	334	0.014	81	0.013	116	0.009	114
DCP11	.349	1.117	0.360	56	0.162	92	0.024	305	0.021		0.026	72	0.031	304	0.037	147	0.012	317	0.017	181
DCP12	.501	0.803	0.364	59	0.069	77	0.026	285	0.021	315	0.016	110	0.010	211	0.012	179	0.011	209	0.006	129
DCP13	.600	0.636	0.326	70	0.054	86	0.026	287	0.039	315	0.014	83	0.009	21	0.008	227	0.008	129	0.004	7
DCP14	.701	0.507	0.278	81	0.070	74	0.011	357	0.043	330	0.005	135	0.001	81	0.008	160	0.007	93	0.013	273
DCP15	.800	0.262	0.216	90	0.052	90	0.030	336	0.016	307	0.011	25	0.010	201	0.008	136	0.009	24	0.002	110
DCP16	.900	0.038	0.098	105	0.054	86	0.035	284	0.028	249	0.034	108	0.021	212	0.023	109	0.003	221	0.007	162
DCP17	.969	0.030	0.047	79	0.026	37	0.025	92	0.020	64	0.020	96	0.009	144	0.014	332	0.010	131	0.026	104

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TAKES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	67.31	0.504	0.200	5.90	0.0	15.07	12007.7	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
67.9 (222.9)	12018. (251.0)	0.32E 07	-0.086	1.589	19.06	-0.00016	0.095	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.072	5.897	0	0.397	337	0.116	194	0.063	148	0.063	359	0.021	116	0.007	152	0.020	188	0.012	15
CN		1.219	0.434	10	0.114	85	0.006	304	0.019	330	0.010	221	0.007	100	0.005	183	0.004	334	0.007	142
CM		-0.017	0.010	356	0.002	251	0.013	46	0.003	185	0.002	271	0.001	189	0.003	348	0.002	158	0.000	43
DCP 1	.010	4.957	1.890	53	0.736	343	0.427	284	0.326	192	0.080	137	0.098	301	0.042	248	0.034	280	0.019	343
DCP 2	.020	4.440	1.861	38	0.508	351	0.230	297	0.207	170	0.061	47	0.020	38	0.015	273	0.050	137	0.042	33
DCP 3	.030	4.241	1.868	26	0.265	301	0.113	336	0.096	149	0.022	212	0.074	354	0.063	189	0.027	56	0.044	345
DCP 4	.049	3.749	1.542	23	0.436	339	0.257	153	0.158	43	0.084	284	0.088	209	0.025	114	0.031	60	0.018	18
DCP 5	.074	3.185	1.391	19	0.359	274	0.266	118	0.137	359	0.091	254	0.048	167	0.044	91	0.022	334	0.024	168
DCP 6	.099	2.916	1.291	14	0.276	239	0.230	86	0.109	324	0.065	230	0.026	128	0.029	39	0.036	283	0.039	123
DCP 7	.149	2.335	1.132	1	0.253	182	0.158	69	0.130	328	0.106	218	0.053	114	0.039	34	0.020	298	0.031	140
DCP 8	.200	2.043	0.986	356	0.237	159	0.135	83	0.106	342	0.078	238	0.083	123	0.051	6	0.020	236	0.050	152
DCP 9	.250	1.763	0.799	342	0.325	123	0.137	23	0.109	273	0.051	154	0.047	36	0.042	276	0.032	156	0.032	114
DCP10	.300	1.536	0.548	338	0.298	102	0.111	343	0.070	236	0.058	111	0.035	339	0.045	222	0.023	63	0.006	168
DCP11	.399	1.248	0.320	342	0.345	99	0.143	321	0.065	153	0.061	44	0.023	237	0.030	187	0.023	347	0.011	13
DCP12	.501	0.871	0.194	3	0.244	75	0.116	270	0.036	135	0.058	347	0.027	141	0.007	109	0.013	230	0.010	224
DCP13	.600	0.653	0.108	26	0.197	67	0.393	245	0.050	46	0.037	273	0.014	35	0.006	301	0.022	126	0.015	201
DCP14	.701	0.471	0.084	85	0.173	57	0.380	207	0.049	12	0.037	241	0.018	68	0.018	224	0.031	354	0.022	238
DCP15	.800	0.295	0.136	115	0.125	52	0.069	170	0.040	328	0.024	130	0.014	314	0.021	157	0.024	305	0.017	130
DCP16	.900	0.145	0.101	111	0.079	35	0.042	164	0.028	280	0.031	155	0.005	249	0.033	123	0.024	249	0.010	13
DCP17	.969	0.046	0.031	129	0.039	59	0.026	122	0.009	54	0.023	76	0.008	246	0.008	315	0.038	82	0.022	83

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TAKES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.O	TEST POINT	CYCLES ANALYSED
0.0	66.74	0.516	0.200	5.96	0.0	17.56	12007.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.MMAX	AERO DAMP	TOR	EXT DAMP
67.8 (222.6)	12023. (251.1)	0.32E 07	-0.259	1.799	23.99	0.00113	-0.682	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		17.561	5.962	0	0.486	331	0.130	203	0.053	115	0.051	1	0.024	58	0.025	176	0.016	125	0.005	311
CN		1.325	0.568	358	0.134	101	0.034	271	0.036	53	0.013	245	0.010	19	0.000	199	0.011	153	0.005	347
CM		-0.077	0.079	54	0.076	243	0.022	86	0.006	234	0.006	13	0.006	229	0.001	298	0.003	59	0.002	78
DCP 1	.010	4.284	2.467	55	0.351	357	0.281	334	0.281	316	0.238	297	0.154	210	0.103	117	0.119	49	0.105	344
DCP 2	.020	3.984	2.623	45	0.519	332	0.201	233	0.132	88	0.101	8	0.119	269	0.114	190	0.128	109	0.101	34
DCP 3	.030	3.817	2.433	40	0.579	336	0.412	254	0.217	152	0.184	105	0.182	7	0.115	317	0.122	242	0.096	183
DCP 4	.049	3.480	2.162	34	0.595	296	0.207	204	0.192	129	0.109	36	0.071	338	0.097	274	0.059	180	0.038	162
DCP 5	.074	3.045	1.894	25	0.423	277	0.230	194	0.209	102	0.110	25	0.094	319	0.084	251	0.089	145	0.072	87
DCP 6	.099	2.798	1.766	20	0.361	259	0.253	170	0.192	80	0.142	357	0.082	283	0.102	217	0.064	123	0.052	42
DCP 7	.149	2.311	1.620	5	0.386	232	0.245	142	0.178	68	0.140	328	0.094	240	0.096	164	0.077	64	0.080	351
DCP 8	.200	2.039	1.453	4	0.349	220	0.213	139	0.201	49	0.161	309	0.100	210	0.075	113	0.043	46	0.035	343
DCP 9	.250	1.769	1.254	357	0.446	177	0.269	79	0.286	349	0.209	279	0.127	141	0.104	51	0.069	318	0.063	199
DCP10	.300	1.601	1.051	340	0.434	156	0.283	42	0.228	297	0.162	184	0.116	77	0.048	318	0.033	230	0.019	95
DCP11	.399	1.393	0.734	333	0.953	140	0.309	12	0.184	255	0.113	139	0.088	36	0.053	287	0.077	175	0.023	20
DCP12	.501	1.109	0.571	317	0.588	107	0.303	312	0.141	186	0.072	62	0.062	318	0.056	154	0.019	87	0.033	262
DCP13	.600	0.902	0.353	267	0.529	81	0.288	271	0.156	111	0.078	330	0.044	205	0.024	64	0.010	103	0.020	210
DCP14	.701	0.752	0.220	237	0.451	47	0.203	232	0.129	72	0.087	258	0.048	80	0.029	267	0.009	225	0.008	343
DCP15	.800	0.555	0.182	188	0.323	21	0.125	207	0.084	13	0.043	184	0.023	340	0.028	163	0.013	202	0.006	282
DCP16	.900	0.248	0.087	162	0.184	358	0.078	206	0.077	12	0.068	145	0.037	347	0.042	44	0.016	243	0.025	329
DCP17	.969	0.163	0.122	196	0.164	346	0.084	104	0.038	224	0.056	334	0.047	96	0.048	210	0.025	307	0.024	118

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	68.82	0.520	0.198	5.93	0.0	19.97	12007.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
67.3 (220.9)	11846 (247.4)	0.326 07	-0.319	2.073	29.94	0.00222	-1.330	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		19.973	5.931	0	0.532	332	0.100	210	0.060	138	0.045	19	0.015	46	0.018	193	0.019	132	0.003	41
CN		1.442	0.659	6	0.056	154	0.033	337	0.032	174	0.009	40	0.016	107	0.003	57	0.011	347	0.008	263
CM		-0.136	0.115	73	0.059	266	0.020	174	0.013	32	0.009	176	0.008	334	0.003	57	0.004	251	0.002	27
UCP 1	.010	3.621	2.713	68	0.619	52	0.230	323	0.132	358	0.234	26	0.163	356	0.135	282	0.151	245	0.127	179
OCP 2	.020	3.413	2.628	62	0.646	43	0.295	318	0.237	296	0.154	161	0.127	94	0.060	43	0.059	328	0.063	313
OCP 3	.030	3.346	2.517	57	0.634	45	0.316	305	0.208	282	0.209	199	0.178	151	0.160	95	0.126	67	0.135	3
OCP 4	.049	3.264	2.264	49	0.545	347	0.353	278	0.237	209	0.135	178	0.175	117	0.105	73	0.110	15	0.122	338
OCP 5	.074	2.902	2.019	40	0.519	325	0.399	252	0.283	174	0.137	129	0.152	69	0.081	22	0.107	329	0.074	274
OCP 6	.099	2.724	1.842	32	0.461	308	0.358	233	0.275	157	0.147	99	0.134	39	0.057	327	0.094	292	0.069	250
OCP 7	.149	2.307	1.740	20	0.524	286	0.319	213	0.293	136	0.116	65	0.146	0	0.085	298	0.100	219	0.091	165
OCP 8	.200	2.063	1.698	19	0.598	271	0.361	199	0.305	108	0.164	39	0.142	333	0.071	265	0.094	213	0.051	136
OCP 9	.250	1.900	1.564	6	0.649	254	0.406	143	0.361	51	0.208	315	0.149	263	0.082	169	0.076	74	0.075	20
OCP10	.300	1.767	1.368	358	0.590	213	0.384	106	0.306	4	0.184	263	0.116	184	0.074	117	0.066	9	0.076	303
OCP11	.349	1.596	1.017	349	0.622	185	0.435	63	0.268	318	0.114	204	0.080	136	0.045	94	0.055	313	0.039	8
OCP12	.501	1.313	0.796	329	0.582	143	0.414	12	0.251	242	0.114	123	0.046	26	0.033	8	0.025	168	0.017	116
OCP13	.600	1.143	0.563	302	0.524	110	0.375	333	0.221	195	0.073	67	0.029	320	0.030	14	0.015	53	0.027	11
OCP14	.731	0.967	0.364	262	0.432	73	0.271	291	0.122	126	0.040	327	0.020	147	0.009	134	0.005	256	0.035	266
OCP15	.800	0.765	0.251	221	0.307	46	0.194	259	0.091	82	0.025	232	0.013	211	0.033	127	0.014	221	0.005	295
OCP16	.900	0.417	0.245	203	0.264	5	0.073	164	0.086	170	0.088	340	0.075	94	0.095	235	0.039	32	0.035	170
OCP17	.969	0.336	0.397	214	0.348	352	0.236	170	0.177	248	0.143	24	0.149	161	0.089	282	0.080	81	0.013	170

FORCED PITCHING OSCILLATION — AIRFOIL — NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.12	0.113	1.308	5.14	0.0	0.03	12009.1	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TOR	EXT DAMP
104.4 (342.5)	28259. (590.2)	0.496 07	-0.338	0.558	5.24	-0.00061	0.6.4	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		0.048	5.136	0	0.238	5	0.050	258	0.004	125	0.007	53	0.029	76	0.034	157	0.041	179	0.004	308
CN		0.126	0.630	355	0.015	2	0.001	124	0.001	237	0.003	272	0.001	106	0.005	211	0.015	214	0.001	49
CM		-0.018	0.012	303	0.002	355	0.001	1	0.000	104	0.001	82	0.001	182	0.002	24	0.006	22	0.001	203
OCP 1	.010	-0.632	3.101	347	0.233	31	0.043	106	0.019	190	0.004	267	0.015	131	0.004	323	0.022	326	0.011	170
OCP 2	.020	-0.331	2.241	350	0.091	351	0.016	353	0.008	217	0.005	339	0.015	155	0.008	350	0.018	349	0.009	195
OCP 3	.030	-0.015	1.868	350	0.074	334	0.012	340	0.005	243	0.004	282	0.005	143	0.001	260	0.013	348	0.005	201
OCP 4	.049	0.106	1.517	350	0.061	334	0.015	358	0.007	211	0.004	208	0.005	126	0.004	46	0.019	349	0.005	312
OCP 5	.074	0.276	1.213	350	0.049	348	0.008	341	0.005	213	0.003	189	0.008	138	0.002	39	0.015	340	0.003	161
OCP 6	.099	0.365	1.053	351	0.044	354	0.014	335	0.005	173	0.003	184	0.003	96	0.002	343	0.014	323	0.006	199
OCP 7	.149	0.231	0.763	352	0.035	7	0.007	9	0.002	36	0.005	312	0.007	170	0.006	332	0.009	325	0.005	163
OCP 8	.200	0.205	0.640	355	0.032	1	0.010	21	0.005	161	0.004	322	0.008	176	0.008	334	0.011	359	0.005	195
OCP 9	.250	0.175	0.559	354	0.026	7	0.003	146	0.002	141	0.003	235	0.001	93	0.007	178	0.023	202	0.003	334
OCP10	.300	0.190	0.466	355	0.018	358	0.002	178	0.003	27	0.006	255	0.003	48	0.006	182	0.015	200	0.004	205
OCP11	.399	0.183	0.371	1	0.010	18	0.005	143	0.004	0	0.010	265	0.008	214	0.024	211	0.003	332
OCP12	.501	0.120	0.263	4	0.008	9	0.008	150	0.003	283	0.003	318	0.001	220	0.006	223	0.021	209	0.003	142
OCP13	.600	0.151	0.220	6	0.005	35	0.006	154	0.008	245	0.003	258	0.003	281	0.007	191	0.024	209	0.004	31
OCP14	.731	0.155	0.156	5	0.002	34	0.005	201	0.001	188	0.002	271	0.003	292	0.008	189	0.024	202	0.004	49
OCP15	.800	0.096	0.094	14	0.001	109	0.001	118	0.001	154	0.004	353	0.003	21	0.010	217	0.023	210	0.006	28
OCP16	.900	-0.061	0.029	24	0.005	200	0.002	224	0.007	28	0.008	232	0.002	359	0.005	218	0.017	190	0.006	8
OCP17	.969	-0.028	0.022	215	0.006	194	0.006	199	0.009	224	0.003	169	0.009	69	0.012	198	0.023	208	0.002	280

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.19	0.115	0.304	5.15	0.0	2.48	12009.2	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
102.9 (337.7)	27617. (576.8)	0.44E 07	-0.030	0.785	7.53	-0.00091	0.753	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		2.455	5.155	0	0.235	6	0.039	261	0.005	203	0.015	14	0.011	89	0.026	184	0.006	142	0.000	21
CN		0.598	0.453	355	0.010	16	0.003	47	0.002	301	0.001	271	0.001	232	0.001	94	0.002	29	0.002	359
CM		-0.019	0.014	299	0.002	272	0.001	247	0.001	139	0.001	355	0.001	155	0.001	348	0.001	221	0.000	179
DCP 1	.010	1.005	2.894	347	0.149	9	0.010	1	0.008	179	0.018	294	0.014	174	0.006	1	0.001	197	0.010	302
DCP 2	.020	0.850	2.274	350	0.109	358	0.040	327	0.003	35	0.010	266	0.019	194	0.007	114	0.005	68	0.015	310
DCP 3	.030	0.969	1.905	350	0.078	355	0.032	334	0.003	169	0.011	318	0.011	141	0.009	80	0.003	155	0.011	330
DCP 4	.049	0.929	1.588	350	0.056	344	0.024	342	0.006	165	0.010	290	0.004	213	0.002	2	0.001	303	0.012	354
DCP 5	.074	0.942	1.259	350	0.045	350	0.017	334	0.006	190	0.006	303	0.002	153	0.003	268	0.001	87	0.004	303
DCP 6	.099	0.924	1.084	351	0.044	1	0.011	334	0.004	158	0.004	311	0.001	257	0.002	295	0.002	160	0.004	303
DCP 7	.149	0.880	0.800	352	0.035	3	0.007	0	0.005	229	0.005	80	0.005	189	0.003	30	0.003	140	0.005	329
DCP 8	.200	0.853	0.612	355	0.030	6	0.009	5	0.002	70	0.007	335	0.005	213	0.005	348	0.003	219	0.005	86
DCP 9	.250	0.870	0.567	355	0.028	13	0.008	358	0.003	31	0.001	171	0.001	118	0.002	317	0.005	22	0.006	82
DCP10	.300	0.847	0.475	359	0.023	21	0.001	298	0.005	318	0.003	25	0.006	213	0.004	4	0.003	336	0.002	341
DCP11	.399	0.865	0.371	1	0.015	32	0.005	305	0.004	342	0.005	258	0.002	123	0.002	356	0.004	356	0.002	326
DCP12	.501	0.876	0.293	4	0.011	37	0.013	321	0.001	289	0.003	265	0.002	95	0.005	100	0.002	297	0.001	158
DCP13	.600	0.884	0.234	8	0.014	49	0.011	303	0.008	270	0.005	199	0.004	358	0.004	144	0.002	260	0.010	58
DCP14	.701	0.875	0.184	10	0.010	59	0.007	78	0.004	8	0.006	177	0.006	10	0.007	140	0.006	40	0.004	8
DCP15	.800	0.892	0.142	17	0.010	74	0.007	34	0.004	289	0.003	67	0.002	309	0.004	154	0.003	87	0.003	22
DCP16	.900	-0.048	0.049	28	0.006	82	0.007	314	0.008	346	0.003	182	0.005	228	0.006	287	0.005	48	0.007	261
DCP17	.969	-0.034	0.013	103	0.002	331	0.011	174	0.001	257	0.004	284	0.001	283	0.002	274	0.005	92	0.003	278

FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.16	0.115	0.302	5.15	0.0	5.01	12009.3	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
102.1 (335.1)	27273. (569.6)	0.48E 07	-0.028	1.009	9.80	-0.00094	0.780	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		5.009	5.147	0	0.237	8	0.036	257	0.033	305	0.013	351	0.006	213	0.027	229	0.005	225	0.004	77
CN		0.594	0.426	356	0.022	19	0.006	44	0.005	248	0.002	321	0.002	202	0.006	350	0.010	334	0.004	222
CM		-0.009	0.015	304	0.002	277	0.001	284	0.001	106	0.000	206	0.000	4	0.001	185	0.002	144	0.001	60
DCP 1	.010	2.563	2.771	347	0.150	16	0.076	340	0.035	224	0.017	154	0.013	145	0.007	339	0.027	352	0.005	223
DCP 2	.020	2.096	2.259	350	0.104	357	0.026	352	0.011	220	0.032	325	0.007	155	0.010	341	0.025	1	0.004	197
DCP 3	.030	2.015	1.913	350	0.087	354	0.013	355	0.002	315	0.005	220	0.000	253	0.007	344	0.014	359	0.007	207
DCP 4	.049	1.797	1.586	350	0.070	348	0.019	355	0.006	143	0.004	262	0.007	251	0.012	343	0.016	9	0.005	152
DCP 5	.074	1.632	1.256	351	0.056	358	0.020	356	0.008	198	0.007	305	0.005	209	0.010	335	0.013	352	0.011	180
DCP 6	.099	1.510	1.061	351	0.050	0	0.015	358	0.005	188	0.005	315	0.005	227	0.008	350	0.012	347	0.008	175
DCP 7	.149	1.098	0.788	353	0.035	5	0.011	360	0.011	195	0.011	298	0.006	215	0.009	5	0.015	338	0.002	164
DCP 8	.200	0.905	0.644	356	0.035	10	0.017	20	0.008	196	0.006	2	0.003	183	0.010	343	0.011	345	0.009	193
DCP 9	.250	0.779	0.557	356	0.030	13	0.008	159	0.005	255	0.003	73	0.005	186	0.001	355	0.011	324	0.002	284
DCP10	.300	0.706	0.481	356	0.022	22	0.006	64	0.002	259	0.006	278	0.005	153	0.005	302	0.010	313	0.004	234
DCP11	.399	0.592	0.364	1	0.018	36	0.012	89	0.004	308	0.008	314	0.002	233	0.010	343	0.008	336	0.007	251
DCP12	.501	0.425	0.280	5	0.018	30	0.008	109	0.007	265	0.002	166	0.001	244	0.005	335	0.010	334	0.002	297
DCP13	.600	0.360	0.211	7	0.015	22	0.011	74	0.011	262	0.004	128	0.005	352	0.002	9	0.008	311	0.002	242
DCP14	.701	0.353	0.144	11	0.020	70	0.006	26	0.032	299	0.007	66	0.003	318	0.008	350	0.010	326	0.006	216
DCP15	.800	0.188	0.083	20	0.011	64	0.007	41	0.001	266	0.006	47	0.004	230	0.004	17	0.012	315	0.003	240
DCP16	.900	-0.044	0.031	35	0.006	110	0.004	104	0.008	291	0.009	272	0.008	162	0.007	0	0.010	356	0.005	241
DCP17	.969	-0.043	0.010	223	0.002	67	0.008	180	0.004	180	0.005	199	0.003	112	0.010	23	0.010	330	0.005	199

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.13	0.116	0.300	5.14	0.0	7.48	12009.4	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.6 (333.2)	27019. (564.3)	0.48E 07	-0.025	1.206	12.50	-0.00112	0.920	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		7.477	5.140	0	0.247	7	0.151	264	0.003	308	0.012	55	0.013	354	0.020	201	0.006	170	0.006	133
CN		0.816	0.403	358	0.028	23	0.002	3	0.003	126	0.002	5	0.000	106	0.002	344	0.010	338	0.004	206
CM		-0.003	0.018	307	0.002	269	0.001	292	0.000	49	0.001	309	0.001	227	0.000	62	0.002	134	0.000	21
DCP 1	.010	4.060	2.718	348	0.158	333	0.100	168	0.129	66	0.086	323	0.014	244	0.022	305	0.021	14	0.015	215
DCP 2	.020	3.261	2.132	351	0.129	23	0.062	342	0.021	223	0.011	300	0.016	198	0.008	334	0.024	33	0.009	244
DCP 3	.030	3.024	1.861	351	0.097	0	0.020	341	0.012	219	0.006	312	0.009	207	0.005	14	0.009	31	0.010	220
DCP 4	.049	2.634	1.528	351	0.093	11	0.030	341	0.011	209	0.003	72	0.003	307	0.009	35	0.020	27	0.004	246
DCP 5	.074	2.295	1.202	352	0.075	15	0.022	336	0.008	209	0.003	349	0.002	16	0.005	16	0.016	20	0.006	186
DCP 6	.099	2.062	1.016	353	0.065	17	0.019	339	0.009	208	0.006	287	0.004	273	0.006	348	0.017	25	0.003	206
DCP 7	.149	1.512	0.768	354	0.050	20	0.007	350	0.010	194	0.008	346	0.006	175	0.010	3	0.015	9	0.006	205
DCP 8	.200	1.243	0.673	357	0.048	16	0.016	337	0.008	148	0.006	26	0.010	208	0.007	11	0.016	22	0.008	194
DCP 9	.250	1.069	0.537	357	0.030	9	0.006	239	0.006	118	0.005	65	0.001	96	0.006	22	0.013	341	0.002	165
DCP10	.300	0.944	0.435	358	0.033	20	0.001	126	0.005	52	0.004	165	0.001	35	0.003	58	0.009	292	0.006	265
DCP11	.349	0.782	0.344	5	0.030	33	0.002	140	0.003	5	0.002	269	0.006	72	0.001	288	0.017	325	0.006	175
DCP12	.501	0.573	0.262	8	0.022	39	0.006	191	0.005	125	0.003	17	0.003	55	0.004	228	0.011	300	0.007	149
DCP13	.600	0.476	0.195	12	0.019	50	0.007	138	0.004	157	0.005	77	0.002	74	0.001	281	0.013	317	0.005	203
DCP14	.701	0.422	0.124	23	0.023	51	0.001	182	0.005	59	0.003	141	0.006	359	0.004	89	0.009	337	0.003	191
DCP15	.800	0.327	0.069	43	0.011	50	0.005	51	0.004	256	0.003	115	0.001	325	0.004	355	0.007	312	0.003	278
DCP16	.900	-0.026	0.029	43	0.001	82	0.005	7	0.006	284	0.002	180	0.001	36	0.007	214	0.009	309	0.004	132
DCP17	.949	-0.049	0.011	100	0.004	273	0.005	149	0.008	135	0.005	302	0.006	142	0.008	310	0.015	0	0.003	305

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.H	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.26	0.117	0.300	5.12	0.0	9.99	12009.5	20

V	Q	RN	CN(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
101.2 (331.9)	26875. (561.3)	0.48E 07	-0.095	1.398	15.10	-0.00048	0.390	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		9.993	5.121	0	0.266	14	0.062	265	0.012	195	0.032	78	0.037	347	0.031	164	0.013	154	0.007	304
CN		0.943	0.351	22	0.099	339	0.037	173	0.020	31	0.014	309	0.014	229	0.015	137	0.013	50	0.014	308
CM		-0.011	0.019	246	0.026	51	0.022	294	0.013	171	0.005	86	0.004	11	0.003	296	0.003	207	0.004	110
DCP 1	.010	4.406	1.172	23	1.153	38	0.619	315	0.396	243	0.315	179	0.208	109	0.113	28	0.056	265	0.078	165
DCP 2	.020	3.521	0.900	29	1.022	45	0.610	320	0.366	236	0.238	166	0.168	102	0.126	48	0.065	355	0.071	302
DCP 3	.030	3.143	0.757	41	0.989	38	0.561	305	0.257	211	0.187	161	0.117	140	0.166	61	0.118	333	0.090	298
DCP 4	.049	3.074	1.076	12	0.383	16	0.135	283	0.078	173	0.048	78	0.034	350	0.015	273	0.010	161	0.004	33
DCP 5	.074	2.612	0.815	15	0.341	16	0.128	275	0.074	169	0.041	53	0.033	324	0.021	216	0.021	133	0.010	16
DCP 6	.099	2.296	0.679	20	0.321	15	0.125	269	0.080	153	0.045	44	0.033	316	0.021	210	0.016	119	0.007	333
DCP 7	.149	1.710	0.553	24	0.267	2	0.116	243	0.062	133	0.036	21	0.020	298	0.005	214	0.012	145	0.004	292
DCP 8	.200	1.450	0.560	23	0.227	339	0.134	211	0.093	96	0.059	357	0.033	277	0.023	204	0.025	120	0.009	347
DCP 9	.250	1.274	0.564	19	0.215	313	0.161	178	0.105	74	0.061	352	0.053	281	0.052	191	0.039	100	0.033	14
DCP10	.300	1.138	0.502	17	0.194	300	0.158	170	0.095	69	0.064	356	0.063	274	0.056	179	0.036	77	0.022	2
DCP11	.499	0.943	0.413	20	0.145	292	0.125	156	0.080	44	0.049	326	0.048	259	0.040	159	0.029	55	0.020	329
DCP12	.501	0.687	0.303	23	0.093	281	0.102	131	0.075	16	0.050	286	0.036	204	0.034	127	0.025	33	0.024	314
DCP13	.600	0.546	0.224	29	0.070	271	0.088	119	0.063	347	0.038	257	0.034	175	0.023	89	0.018	27	0.020	313
DCP14	.701	0.457	0.153	39	0.050	257	0.073	105	0.064	329	0.024	231	0.015	158	0.016	93	0.015	356	0.022	289
DCP15	.800	0.268	0.119	29	0.061	232	0.064	93	0.044	318	0.013	202	0.004	167	0.009	116	0.010	14	0.026	279
DCP16	.900	0.018	0.085	1	0.045	210	0.071	87	0.020	308	0.014	222	0.010	6	0.017	125	0.003	302	0.009	231
DCP17	.949	-0.042	0.036	349	0.026	219	0.019	64	0.012	290	0.006	161	0.004	120	0.008	25	0.005	65	0.008	217

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.22	0.117	0.299	5.08	0.0	12.48	12009.6	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
100.8 (330.8)	26732. (558.3)	0.488 07	-0.183	1.697	16.86	-0.00108	0.878	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		12.478	5.084	0	0.239	16	0.016	315	0.052	351	0.039	291	0.071	165	0.025	230	0.016	35	0.013	306
CN		1.045	0.299	52	0.160	17	0.081	302	0.064	219	0.041	144	0.032	71	0.020	359	0.012	27	0.024	291
CM		-0.025	0.054	199	0.038	93	0.021	45	0.019	347	0.013	281	0.011	210	0.006	139	0.001	102	0.005	76
DCP 1	.010	4.584	0.778	143	1.356	81	0.732	39	0.422	357	0.239	333	0.152	341	0.200	307	0.102	294	0.060	217
DCP 2	.020	3.801	0.606	134	1.171	79	0.497	31	0.259	359	0.167	326	0.085	326	0.149	305	0.106	258	0.098	242
DCP 3	.030	3.302	0.745	135	1.064	69	0.250	25	0.234	39	0.206	360	0.093	319	0.136	308	0.115	255	0.076	233
DCP 4	.049	3.323	0.455	81	0.623	81	0.269	7	0.144	311	0.105	260	0.072	205	0.050	150	0.049	98	0.017	6
DCP 5	.079	2.792	0.414	75	0.560	54	0.232	348	0.116	280	0.066	224	0.049	165	0.029	111	0.036	68	0.015	328
DCP 6	.099	2.448	0.427	60	0.516	48	0.217	336	0.111	265	0.054	236	0.038	161	0.027	118	0.035	71	0.013	344
DCP 7	.149	1.880	0.439	64	0.384	29	0.155	314	0.091	246	0.055	186	0.028	125	0.011	59	0.022	81	0.009	326
DCP 8	.200	1.574	0.401	60	0.344	21	0.169	316	0.136	254	0.096	197	0.062	139	0.034	77	0.033	57	0.019	326
DCP 9	.250	1.385	0.468	53	0.305	8	0.172	305	0.160	241	0.129	168	0.073	111	0.045	78	0.046	41	0.031	316
DCP10	.300	1.229	0.458	50	0.276	1	0.173	300	0.164	234	0.116	165	0.079	115	0.052	61	0.049	36	0.045	334
DCP11	.399	1.041	0.424	48	0.221	351	0.150	294	0.146	229	0.103	163	0.081	107	0.044	54	0.045	48	0.061	341
DCP12	.501	0.797	0.365	41	0.158	331	0.109	273	0.119	203	0.090	129	0.073	74	0.043	16	0.036	13	0.061	303
DCP13	.600	0.637	0.303	40	0.125	309	0.080	241	0.095	182	0.077	106	0.055	41	0.042	350	0.019	349	0.053	275
DCP14	.701	0.542	0.245	38	0.117	287	0.070	220	0.085	155	0.061	82	0.054	16	0.041	316	0.021	298	0.033	240
DCP15	.800	0.345	0.206	21	0.106	269	0.064	218	0.073	143	0.039	66	0.047	9	0.044	293	0.022	232	0.025	198
DCP16	.900	0.071	0.147	6	0.063	264	0.049	215	0.038	136	0.028	65	0.040	354	0.025	265	0.014	197	0.018	208
DCP17	.969	-0.003	0.079	357	0.027	279	0.025	247	0.019	150	0.014	94	0.023	355	0.013	275	0.007	191	0.014	184

FORCED PITCHING OSCILLATION — AIRFOIL NLR 1 — ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.24	0.118	0.298	5.05	0.0	15.04	12009.7	20

V	Q	RN	CM(MIN)	CM(MAX)	ALPHA.MMAX	AERO DAMP	TDR	EXT DAMP
100.6 (330.0)	26660. (556.8)	0.48F 07	-0.218	1.626	17.82	-0.00104	1.332	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1	PHI	RES 2	PHI	RES 3	PHI	RES 4	PHI	RES 5	PHI	RES 6	PHI	RES 7	PHI	RES 8	PHI	RES 9	PHI
ALPHA		15.036	5.048	0	0.224	16	0.022	192	0.027	96	0.082	60	0.136	328	0.040	186	0.039	159	0.014	189
CN		1.093	0.326	81	0.150	52	0.078	5	0.061	341	0.058	285	0.046	246	0.035	205	0.022	167	0.013	142
CM		-0.043	0.075	198	0.023	142	0.027	121	0.018	106	0.018	62	0.013	27	0.010	353	0.010	314	0.003	286
DCP 1	.010	4.240	1.993	159	0.990	110	0.534	126	0.411	129	0.209	114	0.177	154	0.163	134	0.077	119	0.089	110
DCP 2	.020	3.642	1.542	155	0.717	102	0.400	124	0.225	115	0.138	107	0.108	152	0.138	143	0.109	134	0.138	134
DCP 3	.030	3.187	1.483	149	0.617	98	0.475	138	0.165	114	0.212	132	0.091	117	0.130	133	0.070	106	0.093	134
DCP 4	.049	3.350	0.852	136	0.564	130	0.297	81	0.189	51	0.122	17	0.090	346	0.051	301	0.021	337	0.021	18
DCP 5	.079	2.808	0.688	128	0.454	83	0.205	64	0.127	34	0.087	346	0.055	327	0.045	279	0.019	312	0.015	336
DCP 6	.099	2.452	0.688	121	0.391	70	0.165	55	0.115	21	0.086	327	0.039	299	0.037	265	0.014	303	0.004	339
DCP 7	.149	1.939	0.558	96	0.266	55	0.177	41	0.101	3	0.096	331	0.063	286	0.036	245	0.020	312	0.015	234
DCP 8	.200	1.617	0.550	92	0.282	60	0.203	35	0.121	8	0.127	333	0.082	293	0.050	270	0.034	304	0.013	248
DCP 9	.250	1.448	0.530	82	0.291	49	0.200	15	0.133	356	0.140	316	0.095	284	0.060	249	0.037	252	0.033	224
DCP10	.300	1.301	0.479	76	0.263	46	0.181	6	0.139	352	0.126	308	0.088	279	0.069	252	0.043	246	0.035	228
DCP11	.399	1.103	0.430	69	0.209	40	0.149	355	0.117	347	0.106	299	0.090	279	0.050	243	0.051	230	0.038	228
DCP12	.501	0.871	0.374	57	0.144	24	0.122	330	0.083	325	0.087	276	0.073	247	0.053	218	0.057	196	0.036	183
DCP 13	.600	0.715	0.344	48	0.104	3	0.117	318	0.083	298	0.099	259	0.082	226	0.065	200	0.063	167	0.041	144
DCP14	.701	0.608	0.302	39	0.068	329	0.103	299	0.070	284	0.096	239	0.073	200	0.062	170	0.054	130	0.030	109
DCP15	.800	0.417	0.267	23	0.059	317	0.084	293	0.066	261	0.074	225	0.061	187	0.054	155	0.056	101	0.024	77
DCP16	.900	0.136	0.191	11	0.049	333	0.046	282	0.047	266	0.035	199	0.039	168	0.028	128	0.046	100	0.021	17
DCP17	.969	0.023	0.088	12	0.030	348	0.030	288	0.018	256	0.023	219	0.017	161	0.022	137	0.023	109	0.015	91

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.27	0.118	0.299	5.04	0.0	17.91	12009.8	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.6 (330.1)	26703. (557.7)	0.48E 07	-0.214	1.846	17.99	-0.00264	2.151	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		17.912	5.041 0	0.199 4	0.067 238	0.030 189	0.031 142	0.009 112	0.019 236	0.028 34	0.009 56
CN		1.090	0.382 96	0.133 83	0.077 91	0.053 67	0.046 55	0.043 40	0.022 32	0.033 28	0.013 44
CM		-0.057	0.075 206	0.036 237	0.020 196	0.016 197	0.014 186	0.013 182	0.004 169	0.010 180	0.004 166
DCP 1	.010	3.647	2.459 164	0.680 178	0.675 201	0.280 235	0.254 253	0.133 308	0.145 295	0.084 317	0.116 320
DCP 2	.020	3.176	1.924 160	0.475 178	0.416 189	0.194 222	0.145 264	0.127 307	0.141 323	0.131 344	0.114 2
DCP 3	.030	2.780	1.665 153	0.561 206	0.290 180	0.297 220	0.145 268	0.094 260	0.121 302	0.076 337	0.066 344
DCP 4	.044	3.311	0.849 134	0.396 140	0.224 153	0.168 162	0.110 150	0.076 149	0.031 119	0.046 187	0.036 152
DCP 5	.074	2.756	0.830 141	0.287 120	0.157 137	0.101 146	0.084 114	0.038 120	0.025 87	0.027 181	0.028 131
DCP 6	.099	2.416	0.797 129	0.219 113	0.179 123	0.078 111	0.085 99	0.031 83	0.036 82	0.019 143	0.024 114
DCP 7	.149	1.922	0.614 135	0.199 116	0.143 103	0.091 114	0.073 98	0.057 92	0.038 62	0.024 118	0.010 113
DCP 8	.200	1.578	0.599 108	0.270 108	0.177 107	0.149 99	0.113 95	0.082 92	0.037 81	0.055 101	0.023 126
DCP 9	.250	1.435	0.572 99	0.267 97	0.184 100	0.156 80	0.112 93	0.089 73	0.051 86	0.050 64	0.035 107
DCP10	.300	1.291	0.518 91	0.245 88	0.178 97	0.145 80	0.117 85	0.087 77	0.054 76	0.049 76	0.032 105
DCP11	.399	1.115	0.459 82	0.201 77	0.146 85	0.114 73	0.097 74	0.087 72	0.048 67	0.075 67	0.030 84
DCP12	.501	0.901	0.343 69	0.176 67	0.106 62	0.090 63	0.083 66	0.077 63	0.048 39	0.074 30	0.037 61
DCP13	.600	0.746	0.361 58	0.156 45	0.094 42	0.080 19	0.074 25	0.077 15	0.036 6	0.068 9	0.029 33
DCP 4	.701	0.636	0.309 46	0.138 37	0.077 12	0.072 7	0.067 357	0.072 355	0.031 336	0.050 344	0.026 351
DCP15	.800	0.463	0.225 31	0.129 29	0.068 357	0.055 6	0.062 341	0.055 337	0.028 294	0.041 325	0.026 316
DCP16	.900	0.184	0.159 25	0.096 11	0.046 354	0.027 347	0.038 330	0.036 320	0.011 307	0.029 339	0.025 293
DCP17	.969	0.041	0.064 30	0.044 26	0.011 17	0.010 0	0.018 328	0.011 339	0.008 305	0.013 356	0.010 304

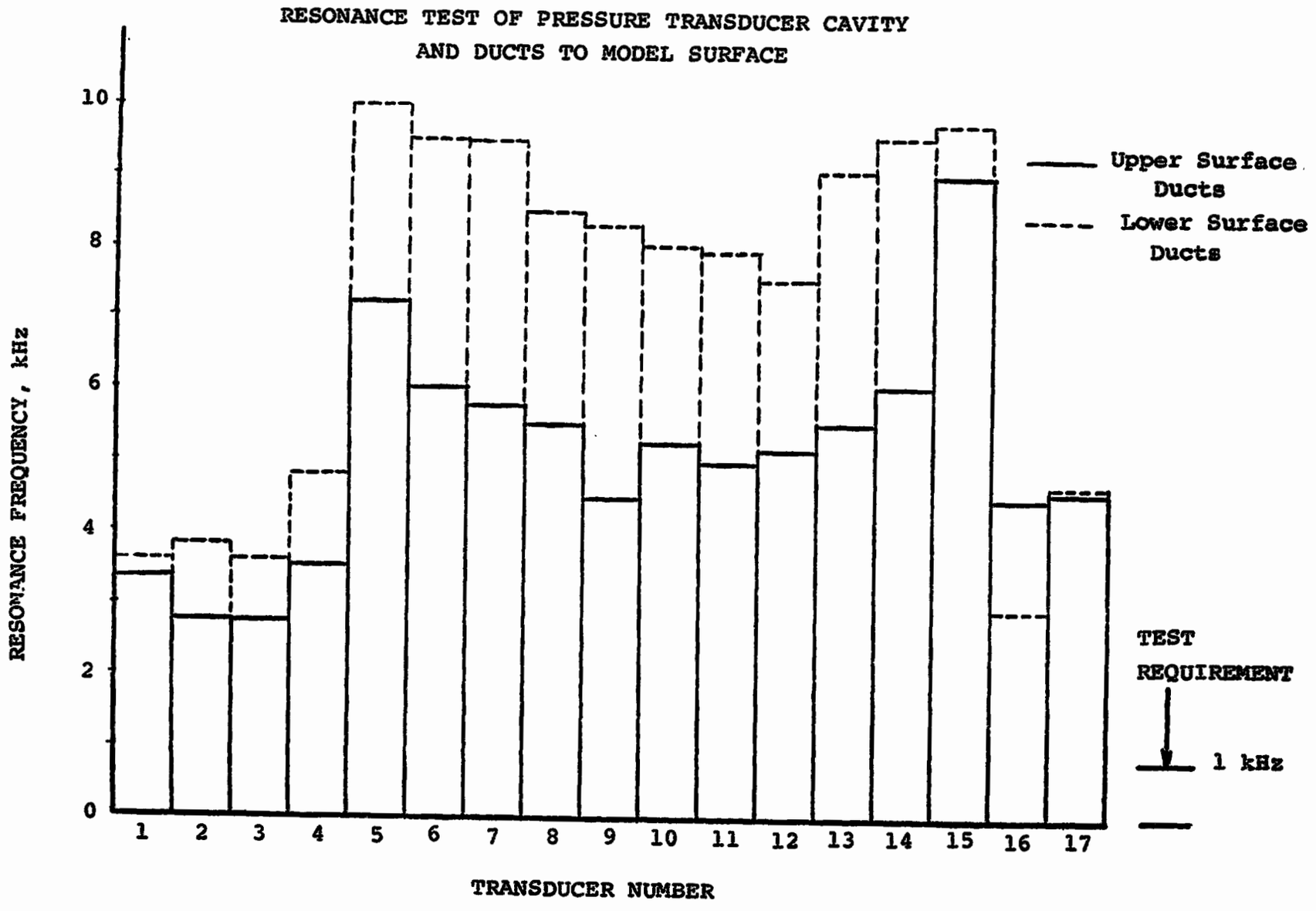
FORCED PITCHING OSCILLATION AIRFOIL NLR 1 ACCELERATION TARES

TUNED HZ	DRIVE HZ	K	MACH NO	DEL.ALPHA	DEL.M	ALPHA.0	TEST POINT	CYCLES ANALYSED
0.0	23.18	0.118	0.298	5.07	0.0	19.95	12009.9	20

V	Q	RN	CM(MIN)	CN(MAX)	ALPHA.NMAX	AERO DAMP	TDR	EXT DAMP
100.4 (329.3)	26607. (555.7)	0.48E 07	-0.199	1.589	18.52	-0.00417	3.388	0.0

HARMONIC ANALYSIS

DATA TYPE	X/C	RES 0	RES 1 PHI	RES 2 PHI	RES 3 PHI	RES 4 PHI	RES 5 PHI	RES 6 PHI	RES 7 PHI	RES 8 PHI	RES 9 PHI
ALPHA		19.946	5.065 0	0.215 6	0.059 245	0.012 251	0.013 8	0.031 298	0.030 193	0.002 105	0.000 21
CN		1.058	0.316 100	0.049 133	0.060 149	0.034 170	0.032 163	0.029 177	0.018 183	0.003 26	0.003 193
CM		-0.085	0.065 234	0.022 243	0.018 276	0.010 295	0.010 338	0.008 335	0.003 349	0.002 191	0.002 355
DCP 1	.010	2.814	1.655 161	0.579 229	0.222 251	0.228 296	0.115 9	0.038 60	0.053 88	0.046 105	0.022 148
DCP 2	.020	2.480	1.201 161	0.459 232	0.193 260	0.157 305	0.072 0	0.035 58	0.021 103	0.051 113	0.018 235
DCP 3	.030	2.276	0.936 155	0.478 227	0.206 284	0.094 323	0.030 16	0.030 56	0.031 132	0.035 125	0.019 216
DCP 4	.044	2.913	0.846 164	0.140 222	0.243 228	0.059 236	0.066 256	0.014 294	0.015 124	0.046 57	0.043 26
DCP 5	.074	2.433	0.619 145	0.113 254	0.182 222	0.030 196	0.041 228	0.007 134	0.017 152	0.033 56	0.031 5
DCP 6	.099	2.119	0.514 126	0.086 230	0.092 214	0.044 201	0.042 204	0.012 157	0.025 152	0.021 67	0.012 36
DCP 7	.149	1.734	0.412 100	0.100 148	0.085 190	0.060 188	0.030 144	0.014 186	0.012 208	0.009 121	0.012 20
DCP 8	.200	1.471	0.410 139	0.124 155	0.111 178	0.058 210	0.054 211	0.044 235	0.026 241	0.005 284	0.007 329
DCP 9	.250	1.361	0.429 103	0.126 148	0.136 152	0.086 193	0.068 187	0.055 217	0.040 219	0.030 277	0.004 341
DCP10	.300	1.255	0.430 98	0.122 142	0.120 149	0.082 191	0.059 192	0.050 212	0.032 210	0.024 262	0.009 286
DCP11	.399	1.147	0.393 94	0.103 131	0.119 139	0.077 189	0.051 188	0.057 202	0.033 217	0.022 272	0.011 238
DCP12	.501	0.959	0.359 84	0.087 103	0.099 126	0.062 163	0.050 162	0.051 171	0.037 180	0.014 230	0.009 238
DCP 3	.600	0.812	0.333 74	0.084 75	0.077 106	0.050 132	0.060 139	0.045 163	0.026 150	0.021 137	0.019 190
DCP14	.701	0.712	0.310 65	0.094 62	0.072 99	0.047 108	0.045 121	0.034 146	0.013 131	0.021 75	0.010 157
DCP15	.800	0.559	0.262 62	0.079 52	0.057 91	0.043 98	0.041 118	0.037 142	0.015 192	0.019 16	0.012 120
DCP16	.900	0.247	0.166 63	0.045 42	0.028 87	0.027 68	0.027 96	0.023 126	0.012 125	0.023 4	0.006 102
DCP17	.969	0.072	0.083 71	0.012 67	0.013 95	0.011 87	0.009 122	0.008 124	0.004 109	0.003 340	0.015 203


RESONANCE TEST OF PRESSURE TRANSDUCER CAVITY
AND DUCTS TO MODEL SURFACE
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Upper Surface Ducts
Lower Surface Ducts
TEST REQUIREMENT
1 kHz

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16 Abstract

A two-dimensional wind tunnel test was conducted to obtain the quasi-steady and unsteady characteristics of the NLR 7223-62, an advanced airfoil designed for helicopter rotor applications.

Differential pressures were measured at 17 locations along the chord of the airfoil model. The airfoil motion were sinusoidal forced pitch oscillations about the quarter chord at amplitudes varying from 2.5° to 10.0° and at frequencies from 23 Hz to 90 Hz. The quasi-steady tests were conducted at Mach numbers from 0.2 to 0.9, and the oscillatory tests between M = 0.2 and M = 0.7. At quasi-steady conditions a limited number of drag measurements was made with a wake-traversing probe. The results of the test are outlined and discussed in Volume I. A systematic tabulation of test results is presented in Volume II.

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